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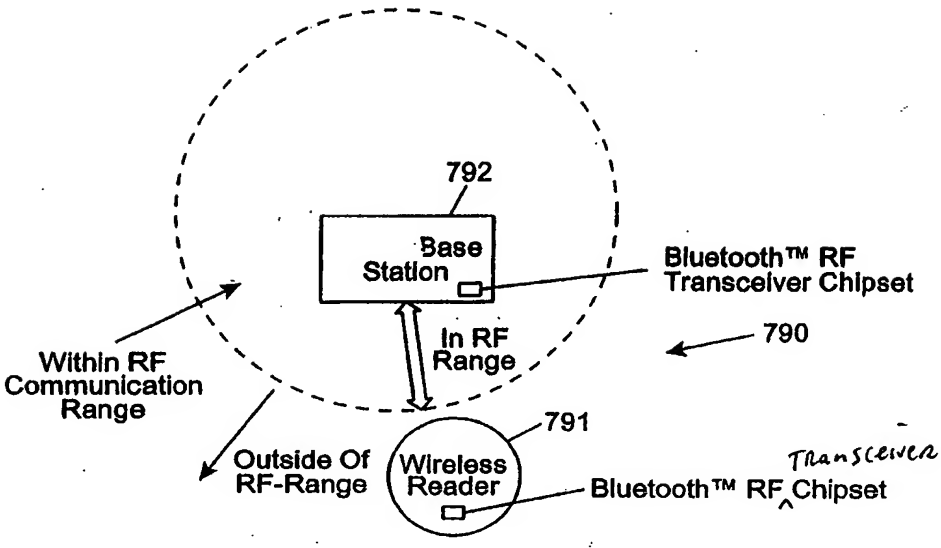

FIG. 1A1

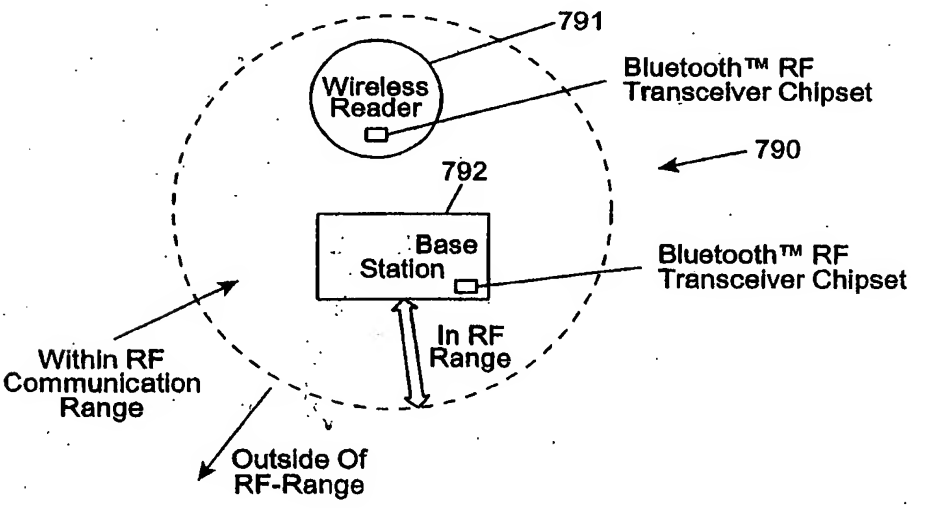

FIG. 1A2

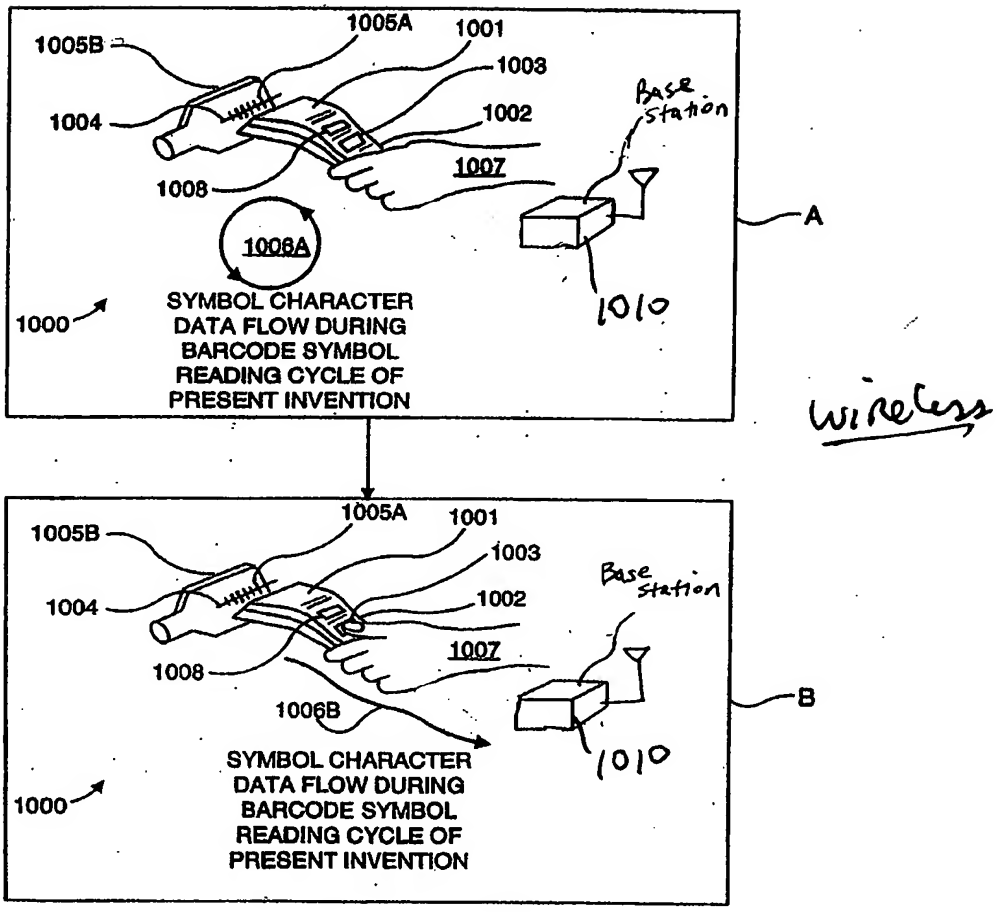
1005B
1005A
1001
1003
1004
1002
1007
1008
1006A
Base station
A
1010
1000
SYMBOL CHARACTER DATA FLOW DURING BARCODE SYMBOL READING CYCLE OF PRESENT INVENTION
wireless
1005B
1005A
1001
1003
1004
1002
1007
1008
1006B
Base station
B
1010
1000
SYMBOL CHARACTER DATA FLOW DURING BARCODE SYMBOL READING CYCLE OF PRESENT INVENTION

FIG. 1A3

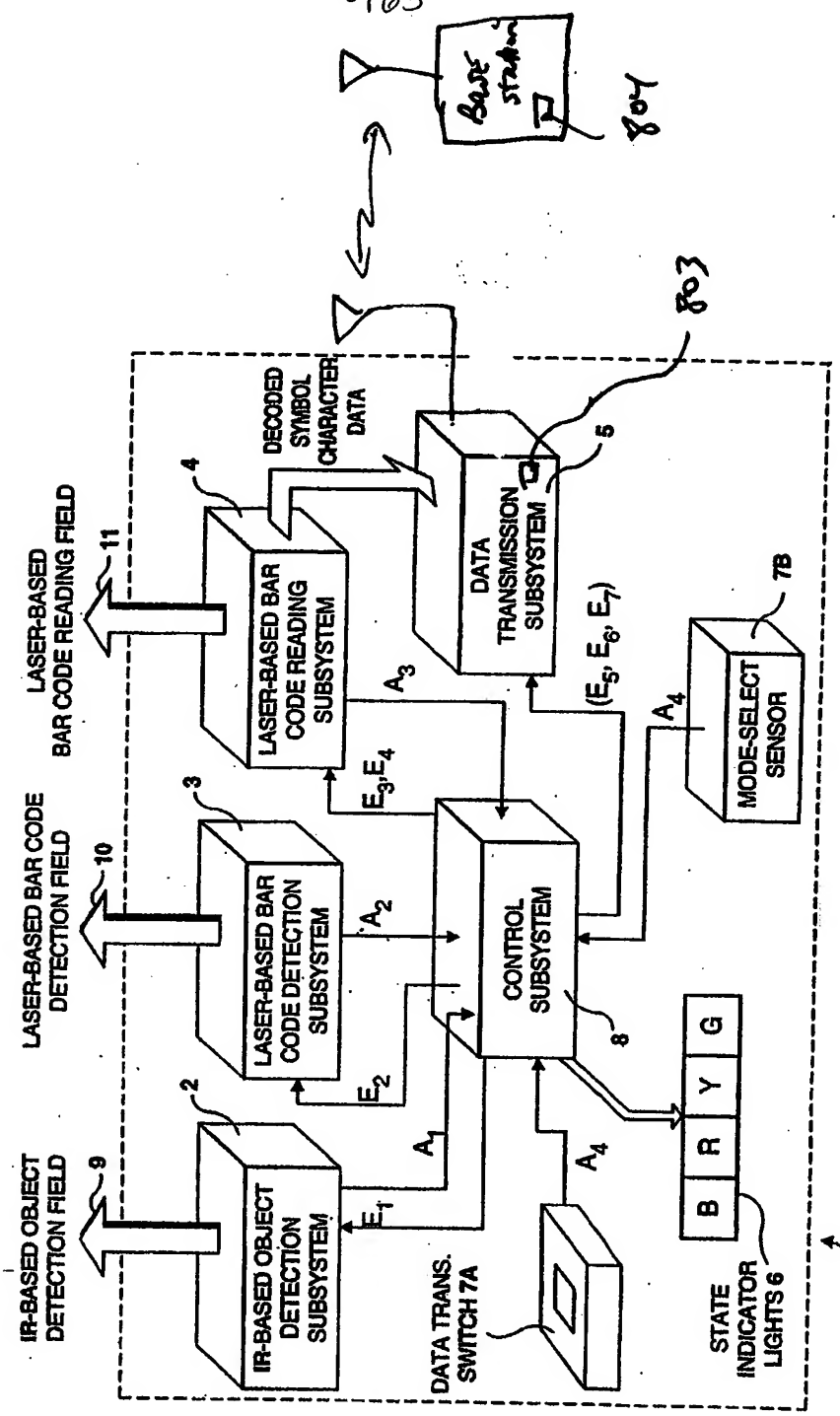
BASE STATION
804
803
DECODED SYMBOL CHARACTER DATA
LASER-BASED BAR CODE READING FIELD
LASER-BASED BAR CODE DETECTION FIELD
IR-BASED OBJECT DETECTION FIELD
LASER-BASED BAR CODE READING SUBSYSTEM
LASER-BASED BAR CODE DETECTION SUBSYSTEM
IR-BASED OBJECT DETECTION SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
CONTROL SUBSYSTEM
MODE-SELECT SENSOR
DATA TRANS. SWITCH 7A
STATE INDICATOR LIGHTS 6
B
R
Y
G
A_1
A_2
A_3
A_4
E_1
E_2
E_3, E_4
(E_5, E_6, E_7)

FIG. 1B

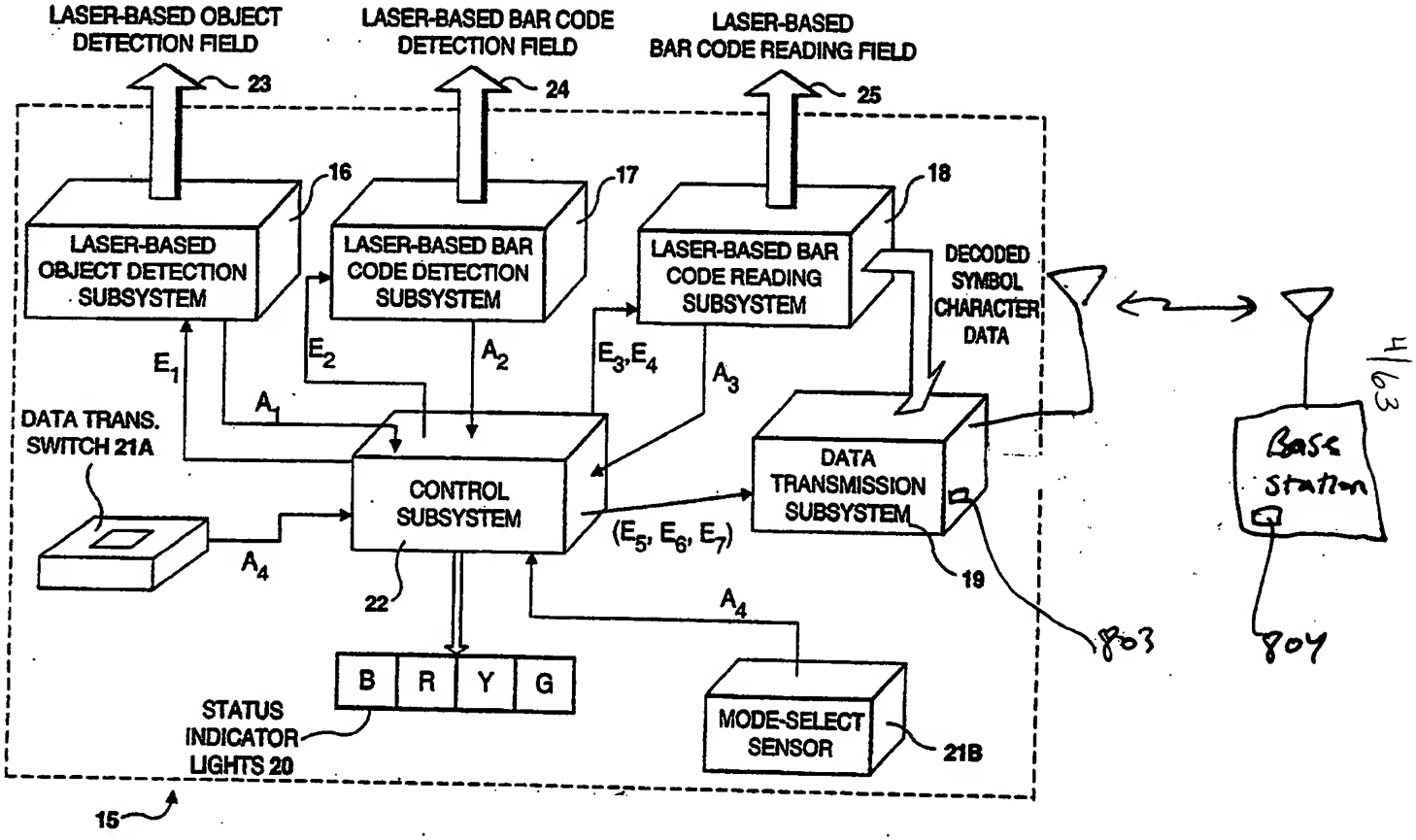
LASER-BASED OBJECT DETECTION FIELD
23
LASER-BASED BAR CODE DETECTION FIELD
24
LASER-BASED BAR CODE READING FIELD
25
16
17
18
LASER-BASED OBJECT DETECTION SUBSYSTEM
LASER-BASED BAR CODE DETECTION SUBSYSTEM
LASER-BASED BAR CODE READING SUBSYSTEM
DECODED SYMBOL CHARACTER DATA
E1
E2
A2
E3,E4
A3
A1
DATA TRANS. SWITCH 21A
CONTROL SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
A4
(E5, E6, E7)
19
22
A4
B
R
Y
G
STATUS INDICATOR LIGHTS 20
MODE-SELECT SENSOR
21B
15
803
804
Base Station

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FIG. 1C

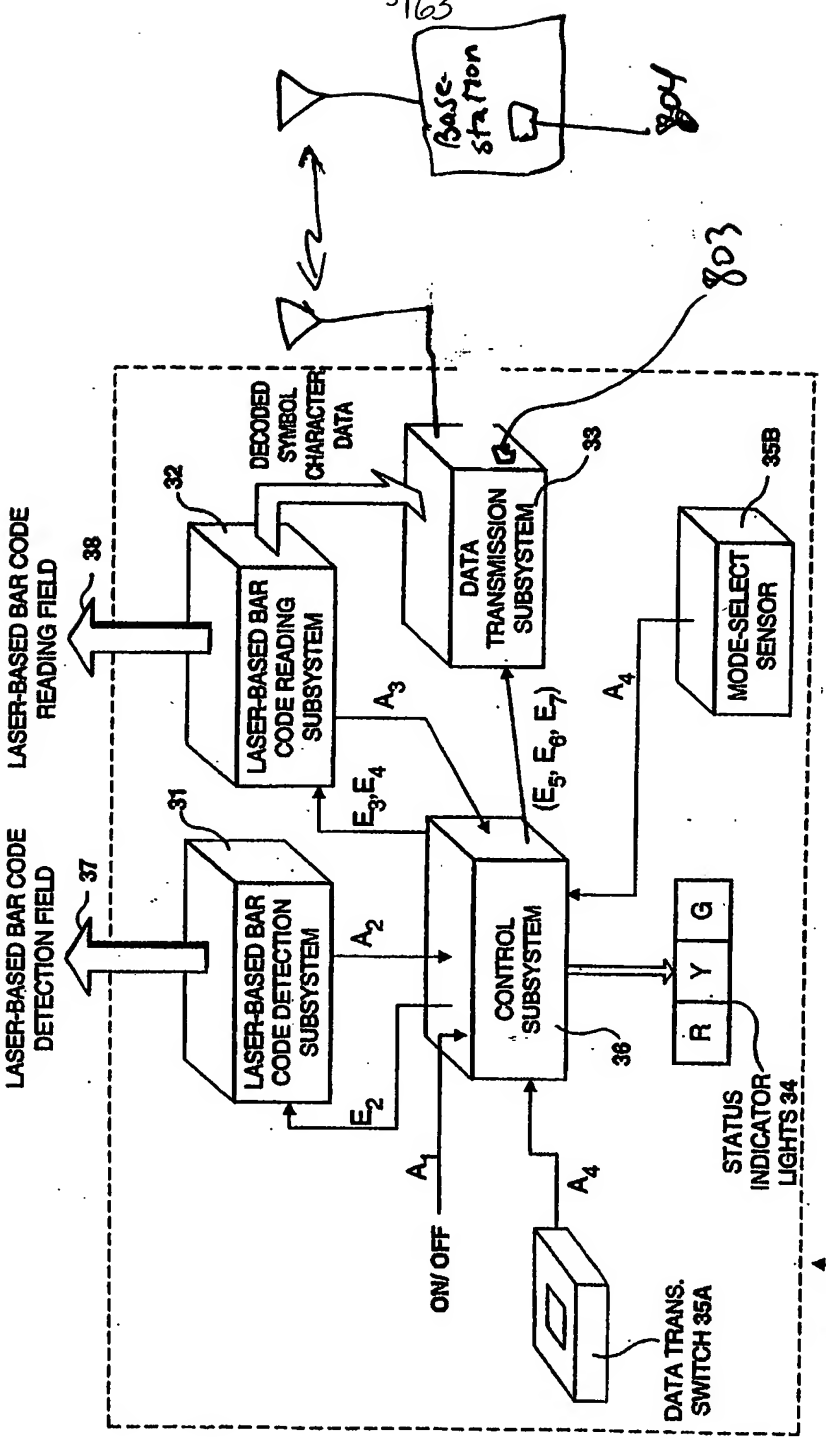
Base-station
Boy
803
DECODED SYMBOL CHARACTER DATA
32
33
35B
LASER-BASED BAR CODE READING FIELD
38
LASER-BASED BAR CODE READING SUBSYSTEM
DATA TRANSMISSION SUBSYSTEM
MODE-SELECT SENSOR
A3
A4
E3,E4
(E5, E6, E7)
LASER-BASED BAR CODE DETECTION FIELD
37
31
LASER-BASED BAR CODE DETECTION SUBSYSTEM
A2
CONTROL SUBSYSTEM
R
Y
G
36
E2
A1
A4
ON/ OFF
STATUS INDICATOR LIGHTS 34
DATA TRANS. SWITCH 35A
30

FIG. 1D

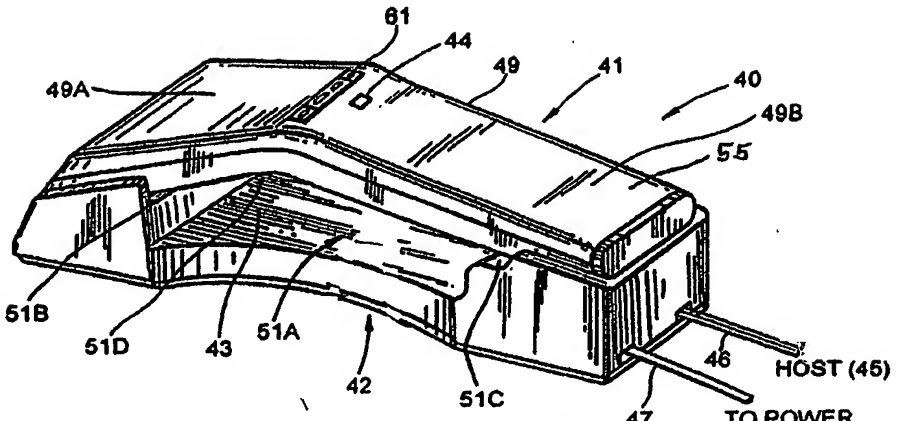

FIG. 2A

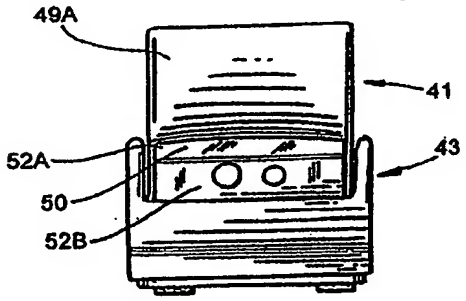

FIG. 2B

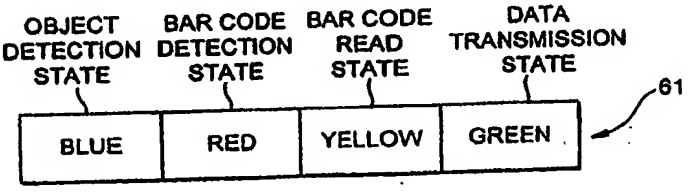

FIG. 2C

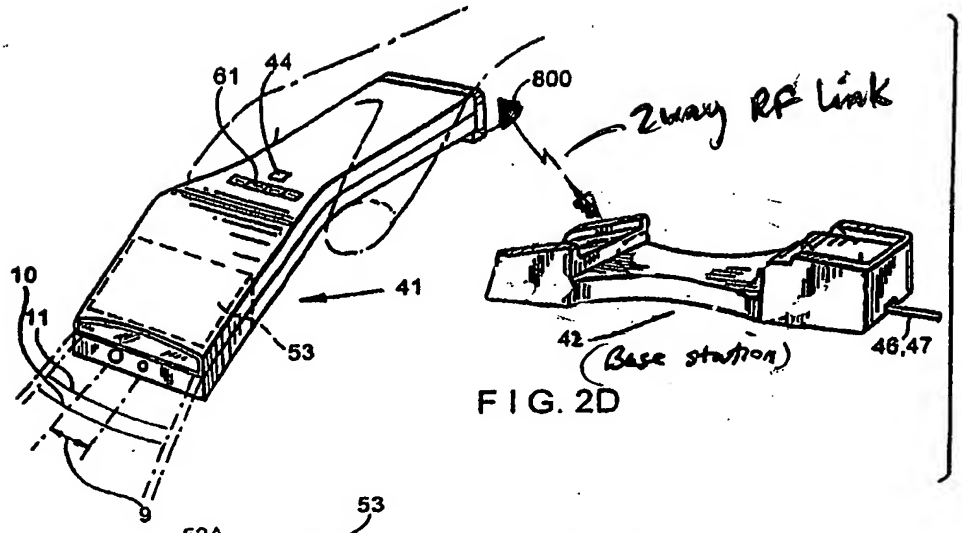

FIG. 2D

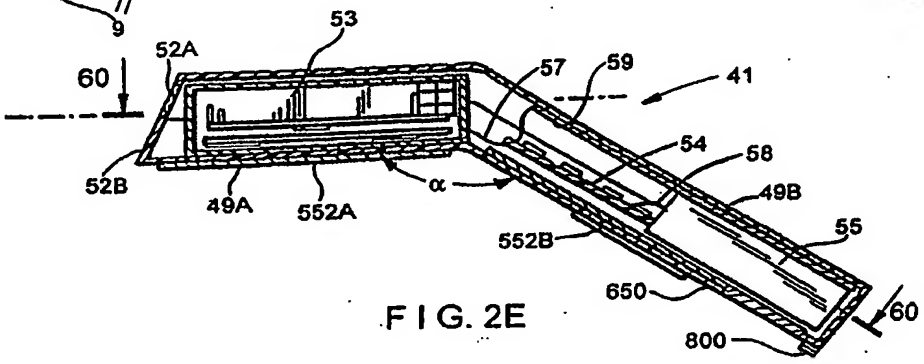

FIG. 2E

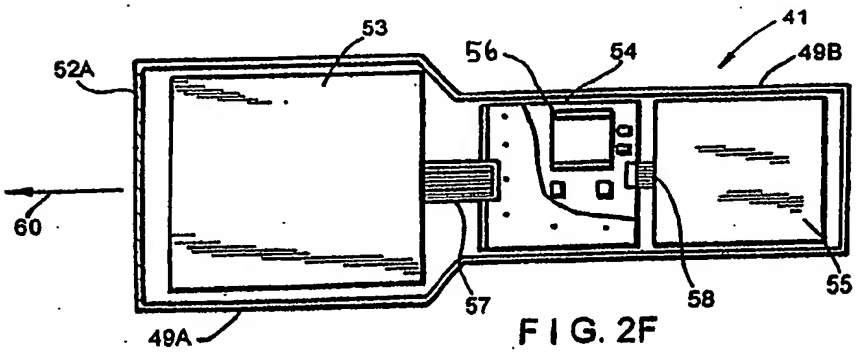

FIG. 2F

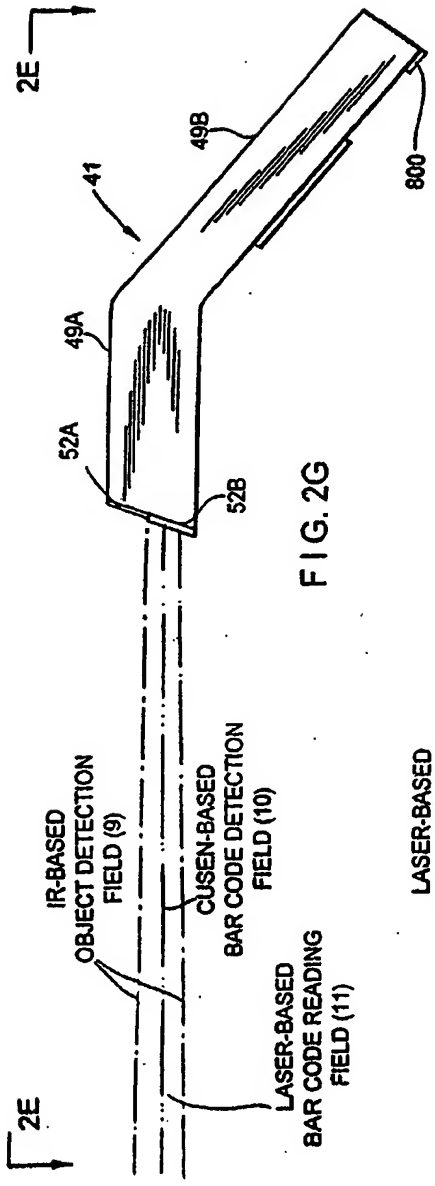
2E
41
49B
800
49A
52A
52B
IR-BASED OBJECT DETECTION FIELD (9)
CUSEN-BASED BAR CODE DETECTION FIELD (10)
LASER-BASED BAR CODE READING FIELD (11)
2E

FIG. 2G

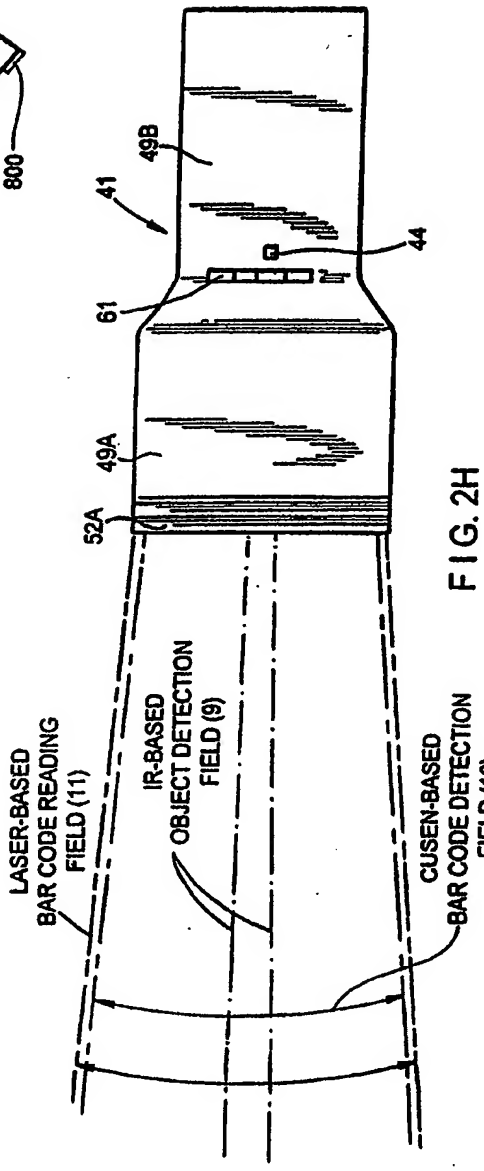
41
49B
44
61
49A
52A
LASER-BASED BAR CODE READING FIELD (11)
IR-BASED OBJECT DETECTION FIELD (9)
CUSEN-BASED BAR CODE DETECTION FIELD (10)

FIG. 2H

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2nd

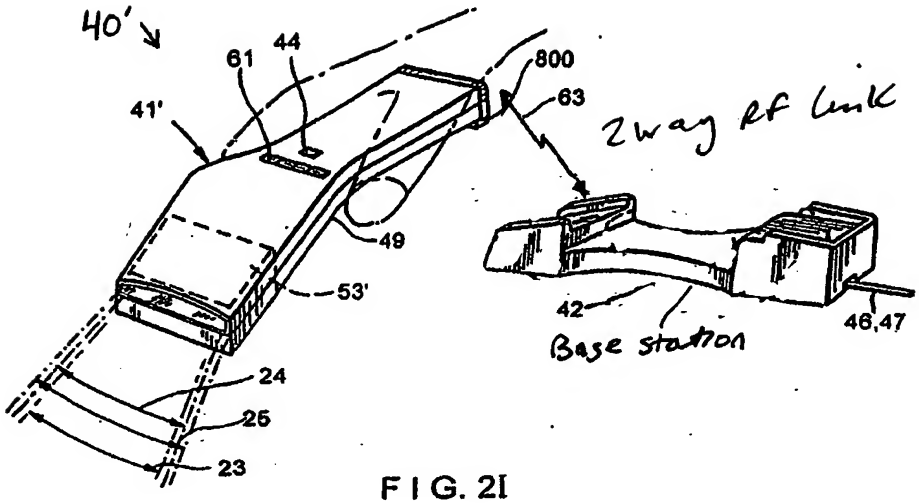

FIG. 2I

3rd

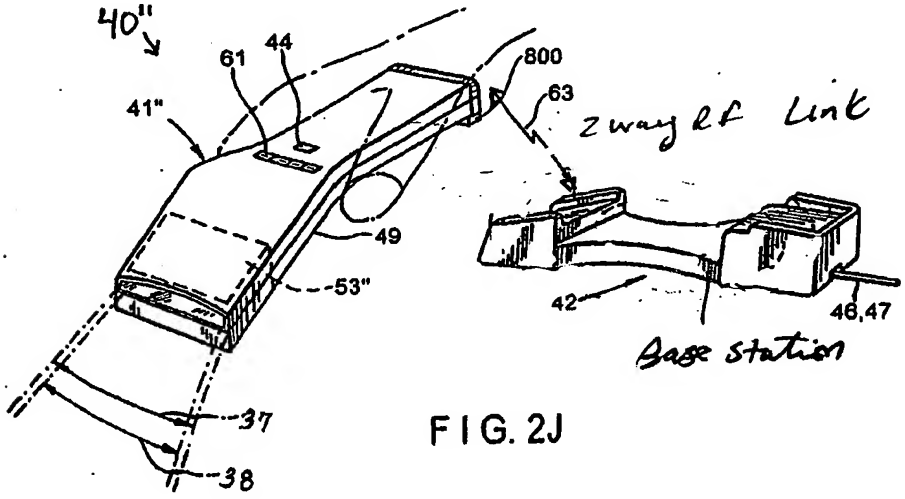

FIG. 2J

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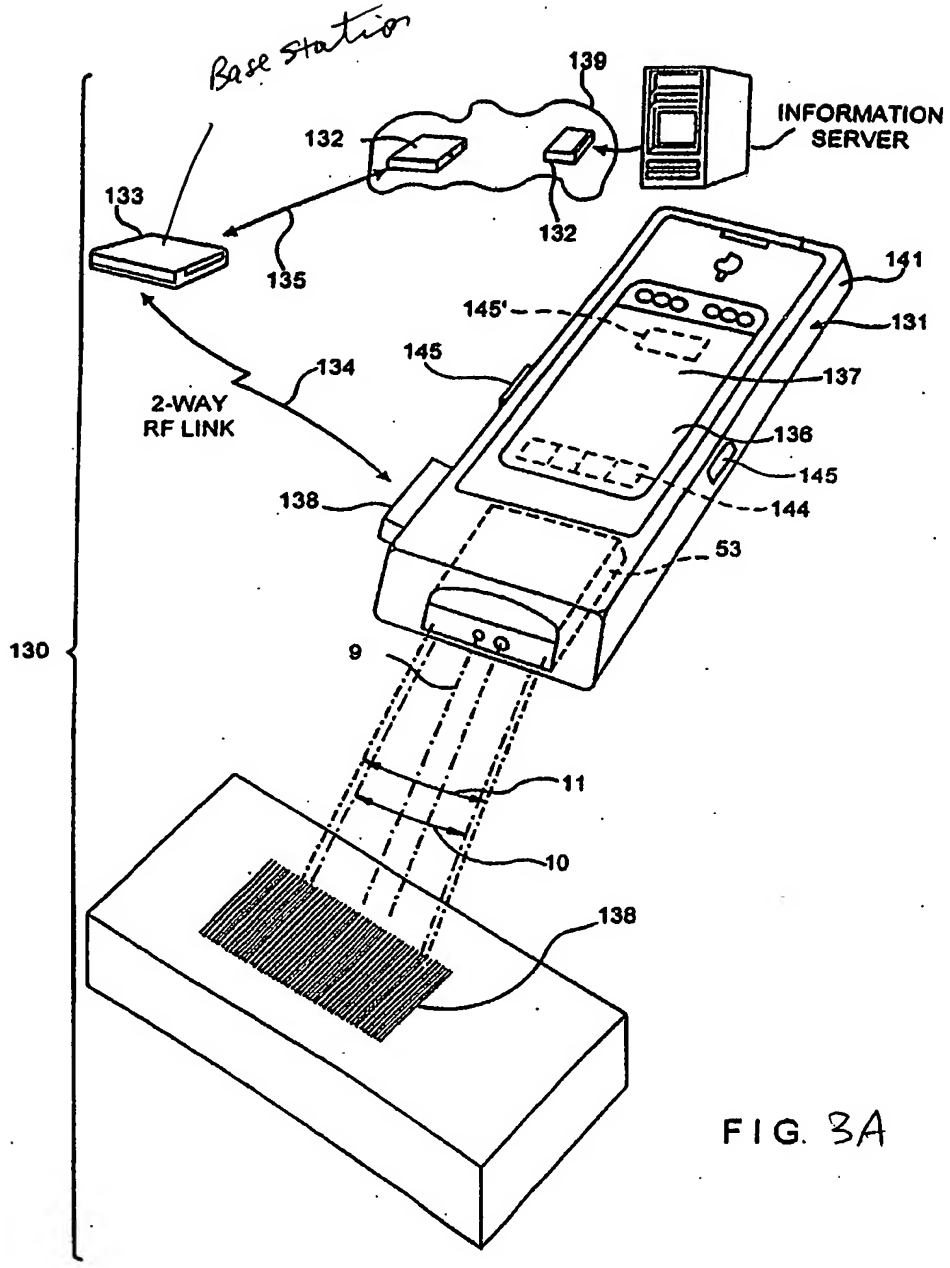

FIG. 3A

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513

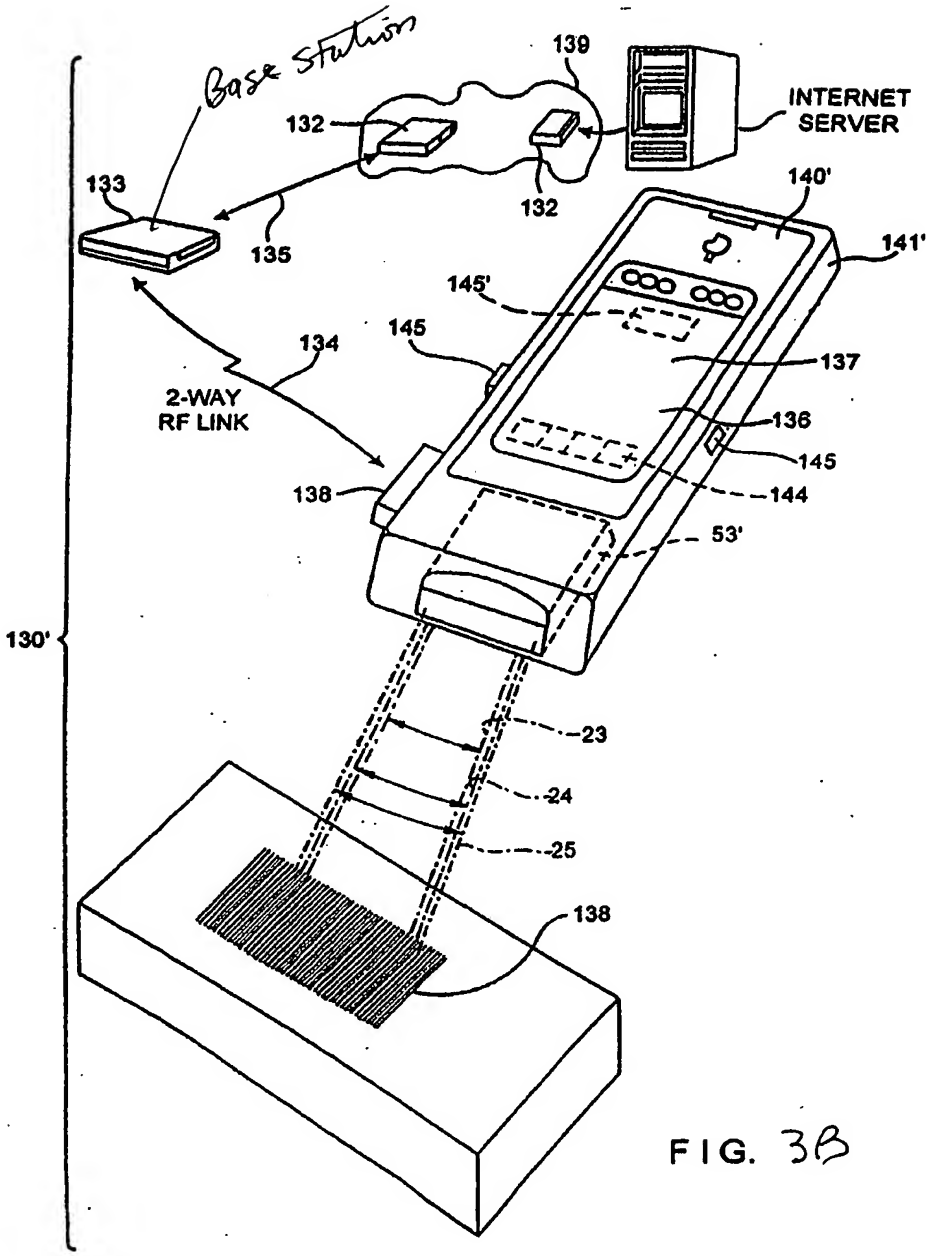


FIG. 3B

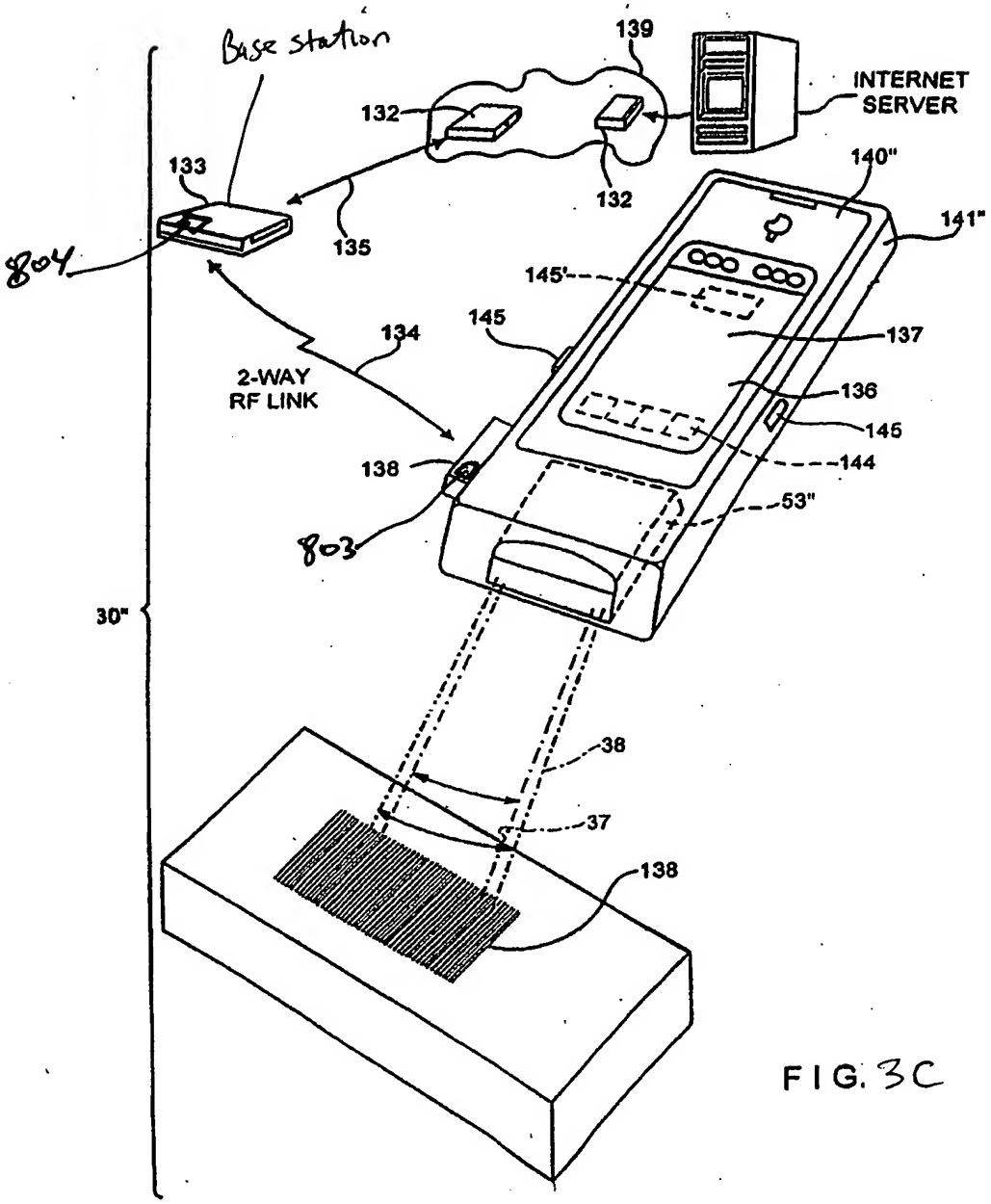

Base station
139
INTERNET SERVER
132
132
133
140"
141"
804
135
145'
145
134
137
2-WAY RF LINK
136
145
138
144
803
53"
30"
38
37
138

FIG. 3C

7/13

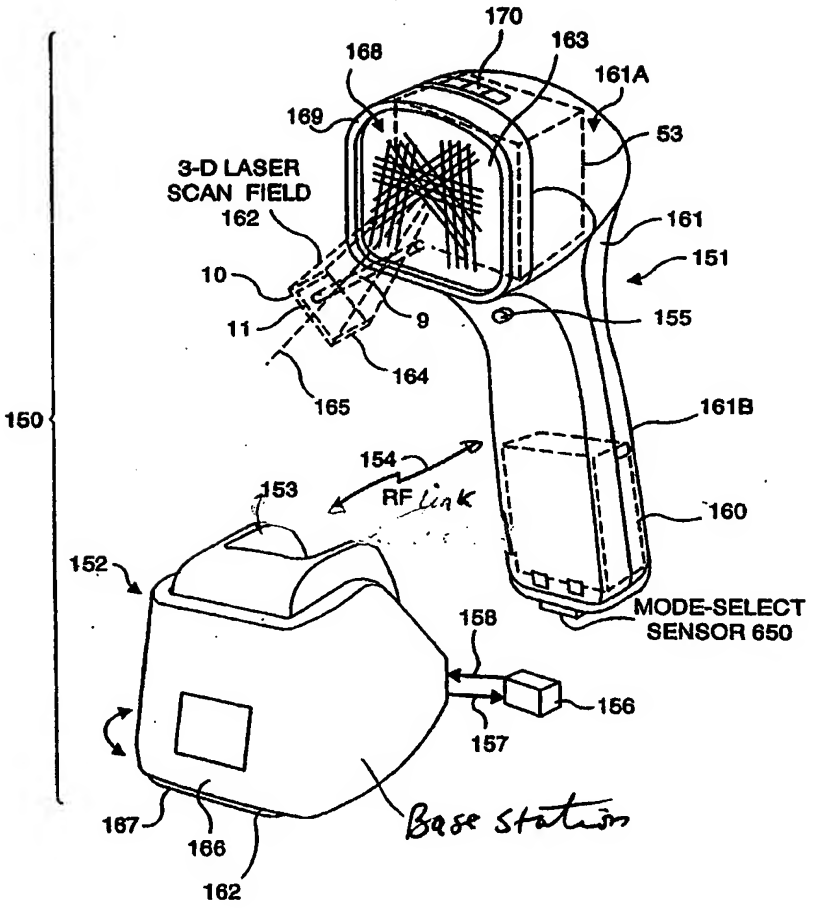

170
163
168
161A
169
53
3-D LASER
SCAN FIELD
162
161
151
10
155
11
9
164
165
161B
150
154
RF Link
153
160
152
MODE-SELECT
SENSOR 650
158
156
157
Base station
167
166
162

FIG. 4A

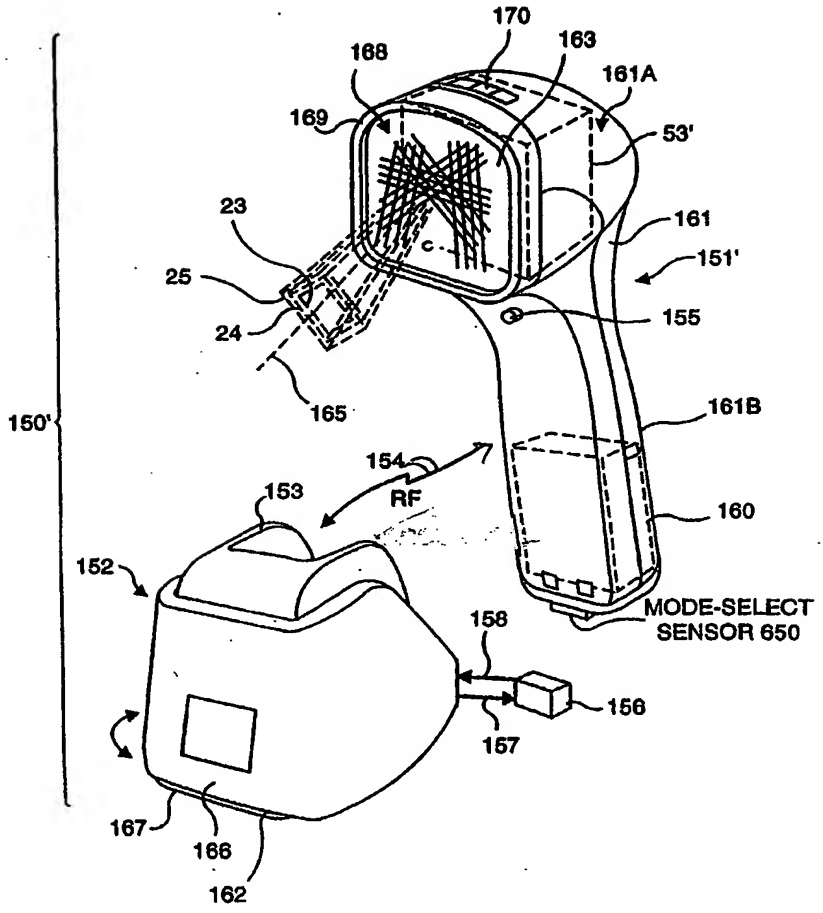

170
163
168
161A
169
53'
23
161
25
151'
155
24
165
150'
161B
154
RF
153
160
152
MODE-SELECT
SENSOR 650
158
156
157
167
166
162

FIG. 4B

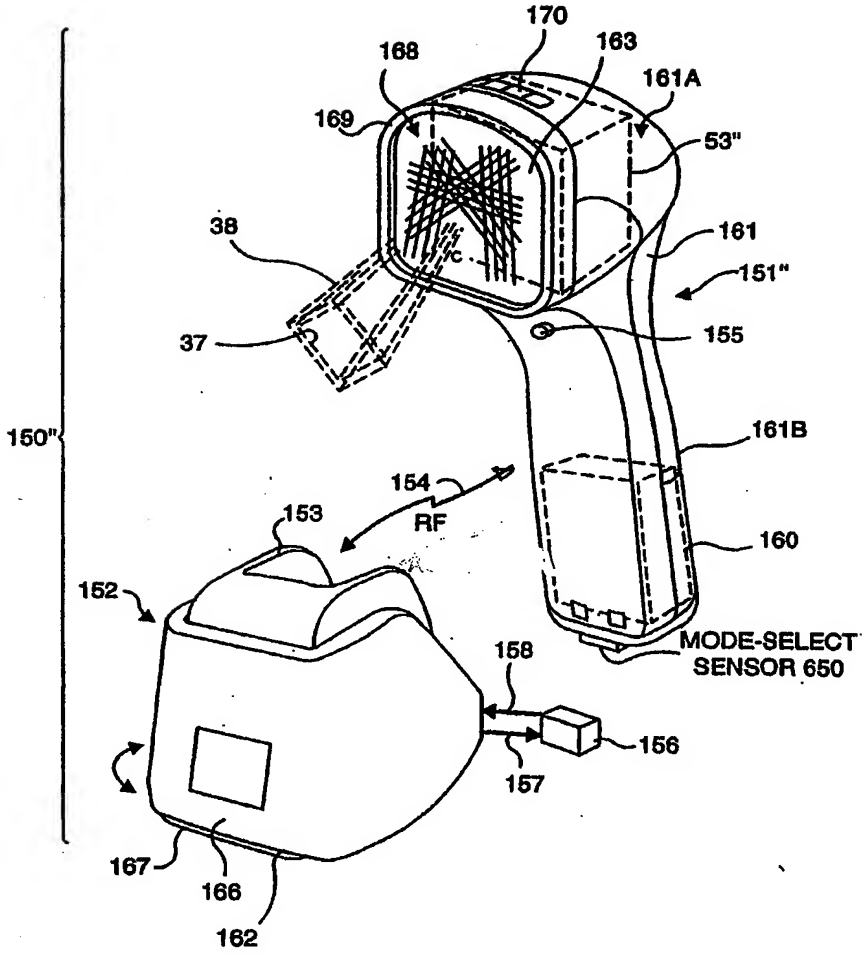

170
168
163
161A
169
53"
38
161
151"
37
155
150"
161B
154
RF
153
160
152
MODE-SELECT
SENSOR 650
158
156
157
167
166
162

FIG. 4C

Automatic Bar Code Reading System With
2-Way RF Communication Link

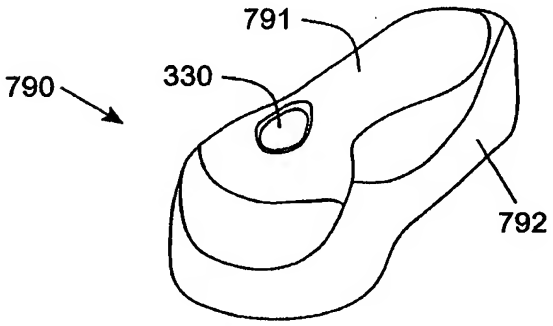


FIG. 5A

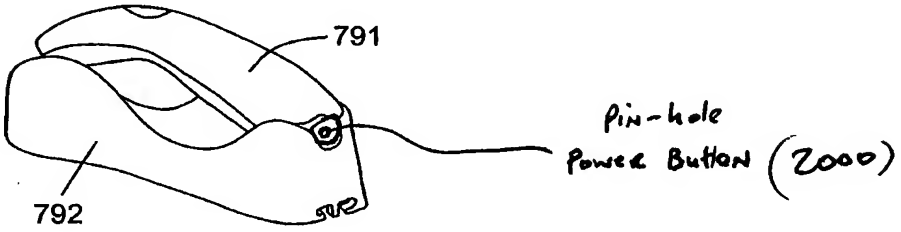


FIG. 5B

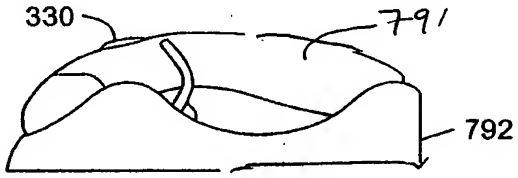


FIG. 5C

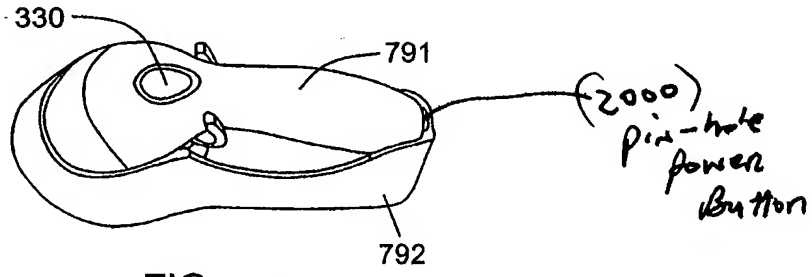


FIG. 5D

Protracted Configuration

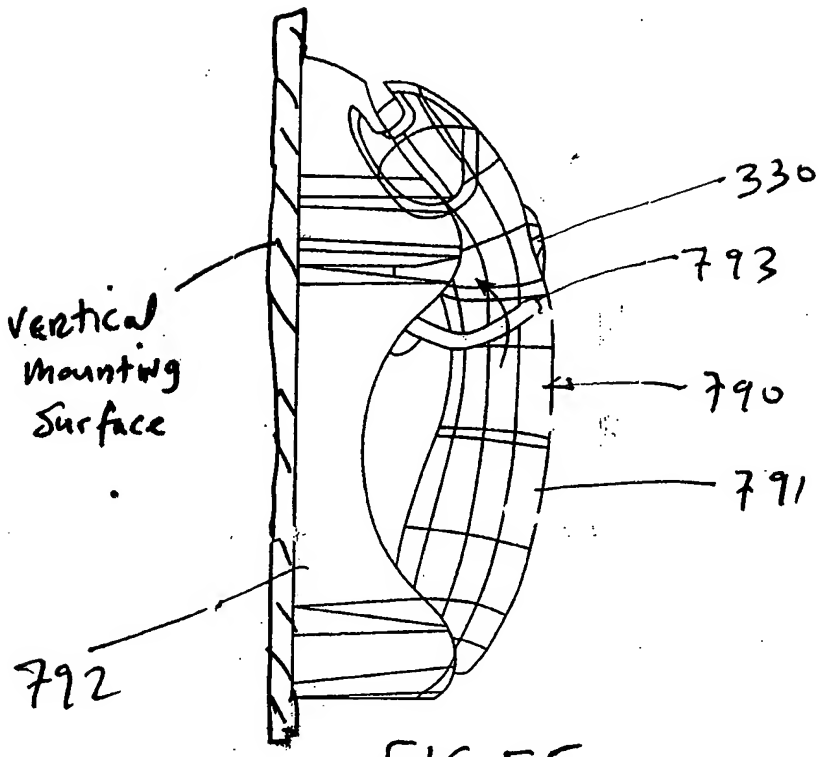


FIG. 5E

Protracted Configuration

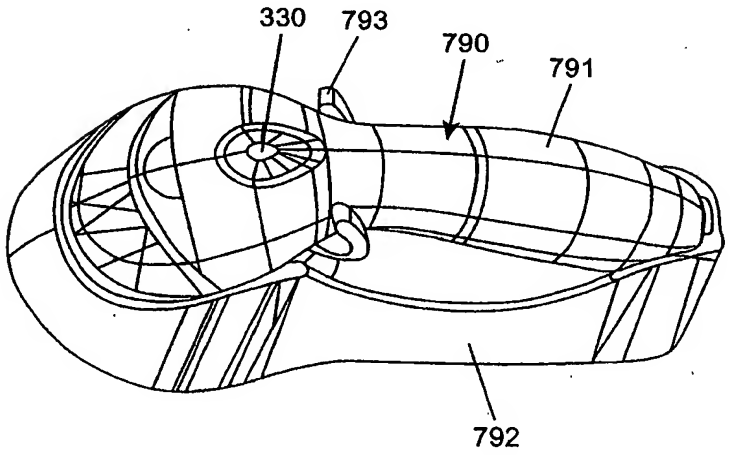


FIG. 5F

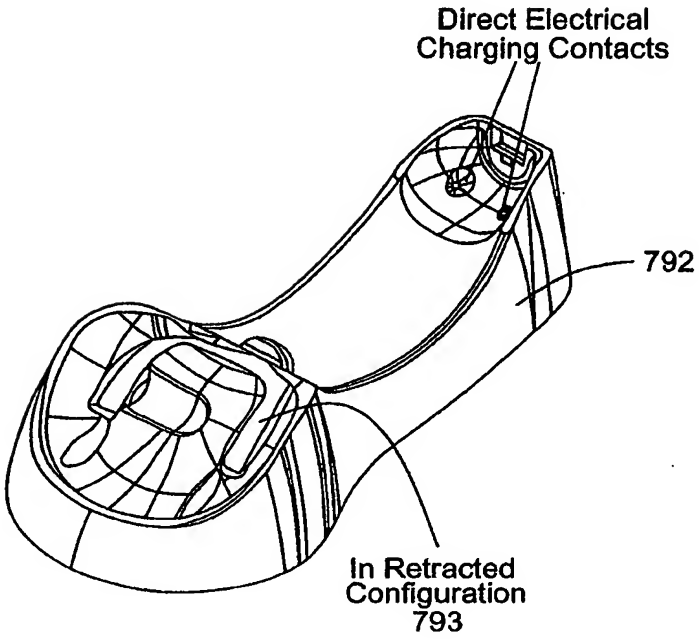

Direct Electrical
Charging Contacts
792
In Retracted
Configuration
793

FIG. 5G.

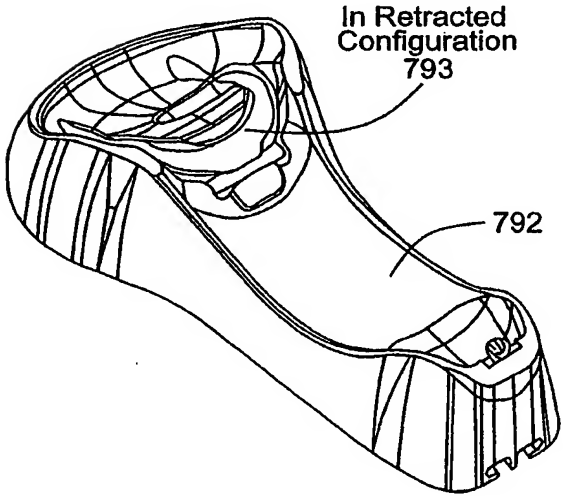

In Retracted
Configuration
793
792

FIG. 5H

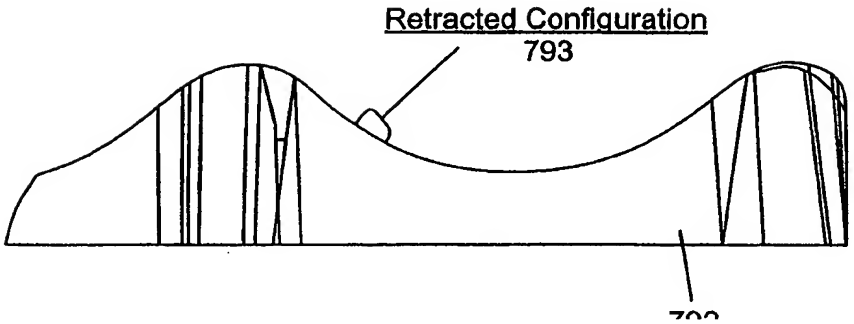

Retracted Configuration
793

FIG. 5I

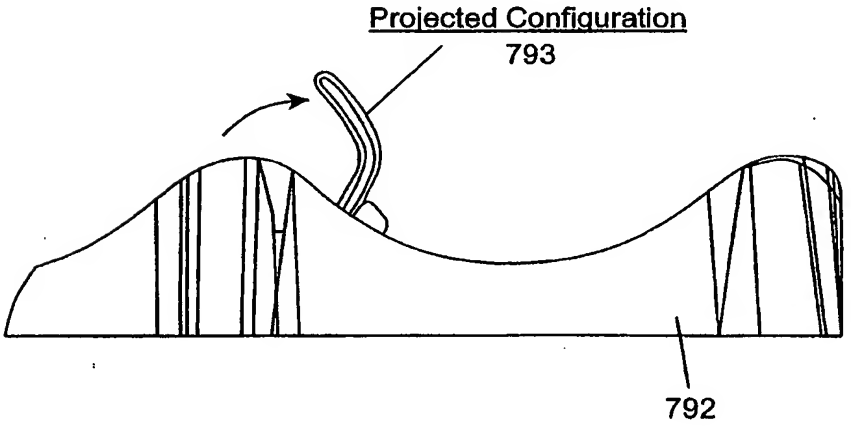

Projected Configuration
793
792

FIG. 5J

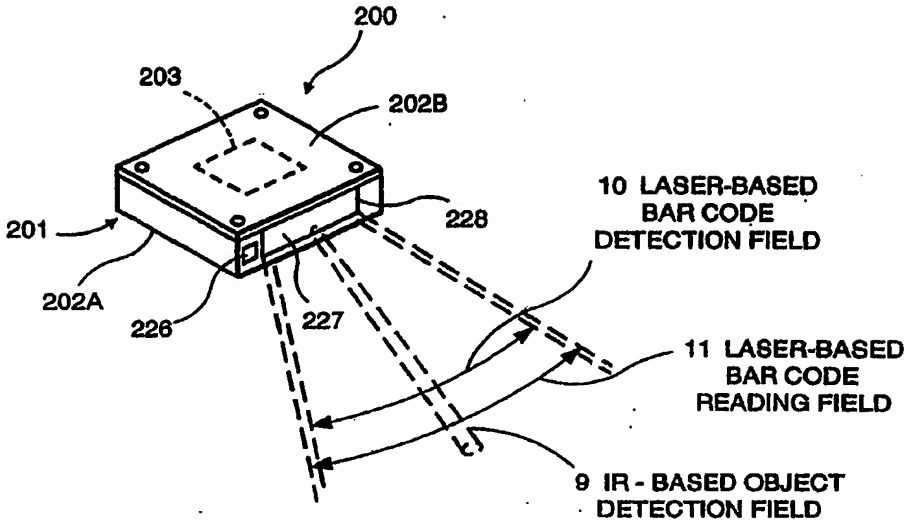

200
203
202B
201
228
10 LASER-BASED BAR CODE DETECTION FIELD
202A
226
227
11 LASER-BASED BAR CODE READING FIELD
9 IR - BASED OBJECT DETECTION FIELD

FIG. 6A

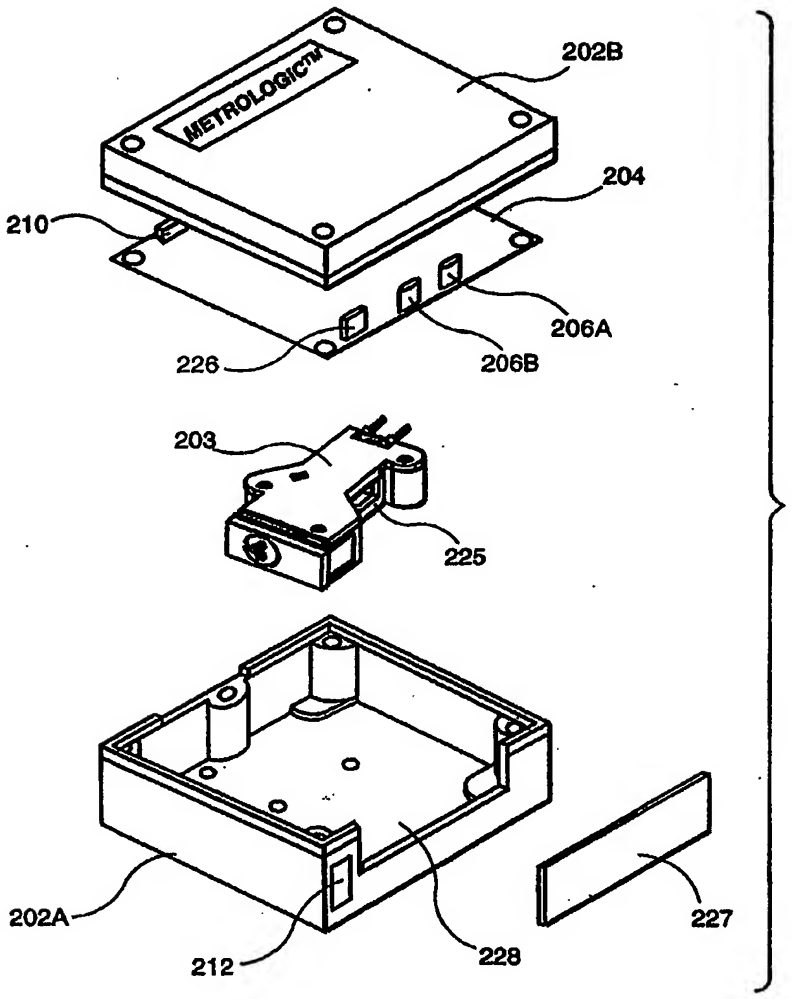

METROLOGIC™
202B
204
210
206A
206B
226
203
225
202A
212
228
227

FIG. 6B

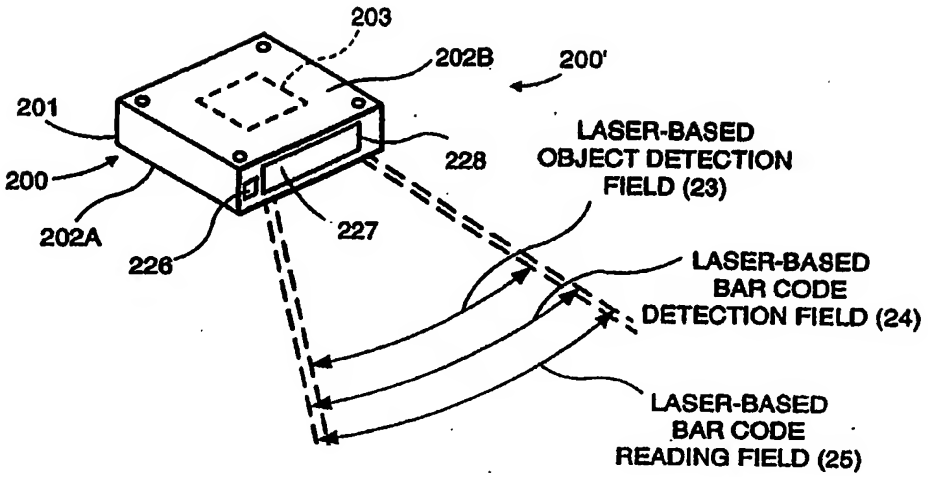

203
202B
200'
201
200
228
LASER-BASED
OBJECT DETECTION
FIELD (23)
202A
226
227
LASER-BASED
BAR CODE
DETECTION FIELD (24)
LASER-BASED
BAR CODE
READING FIELD (25)

FIG. 6E

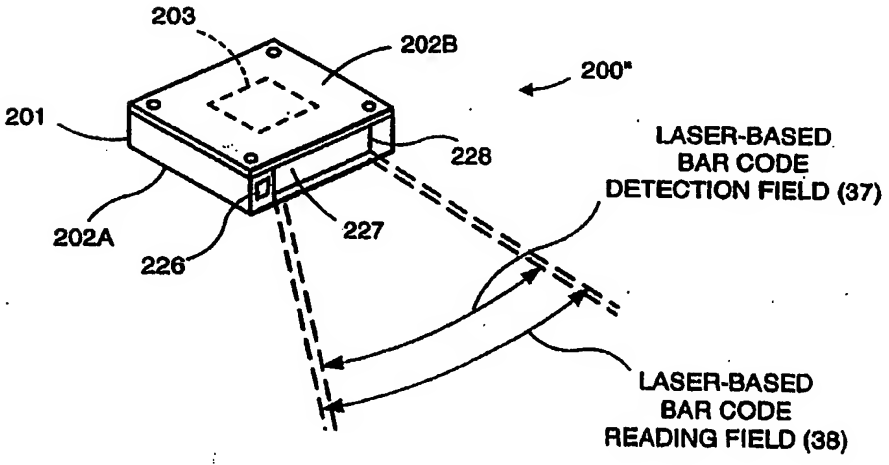
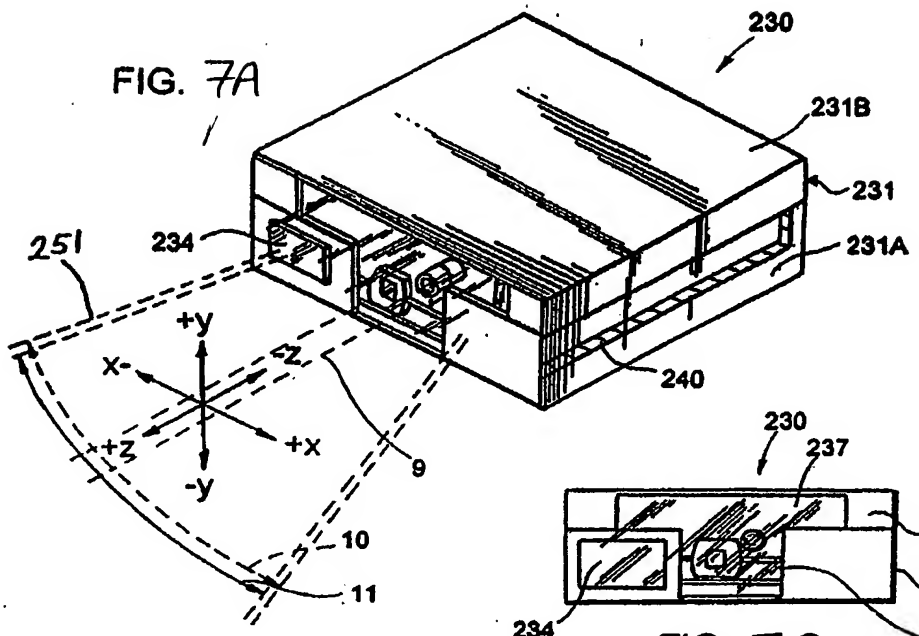

203
202B
200"
201
228
LASER-BASED
BAR CODE
DETECTION FIELD (37)
202A
226
227
LASER-BASED
BAR CODE
READING FIELD (38)

FIG. 6F

FIG. 7A



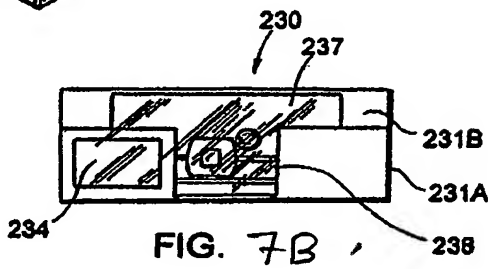


FIG. 7B

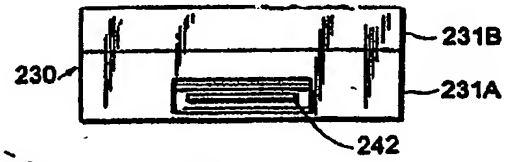


FIG. 7C

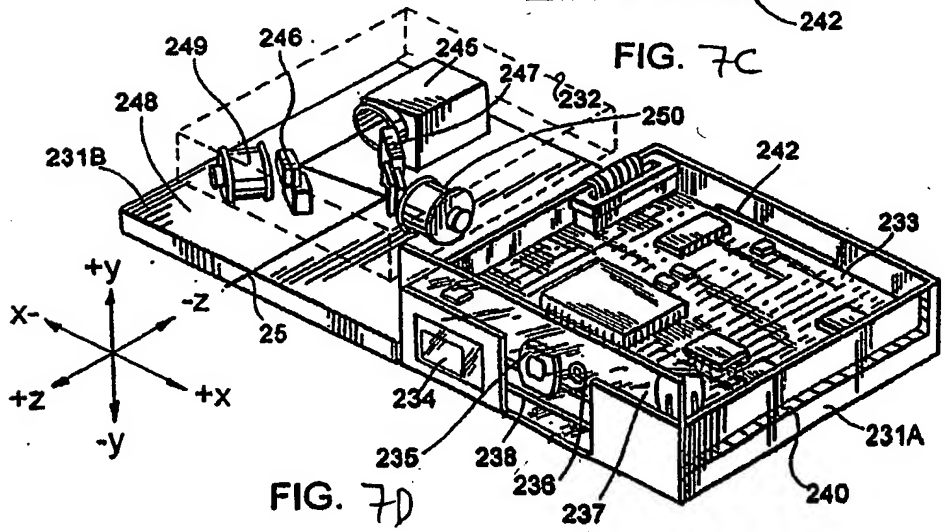


FIG. 7D

FIG. 7E

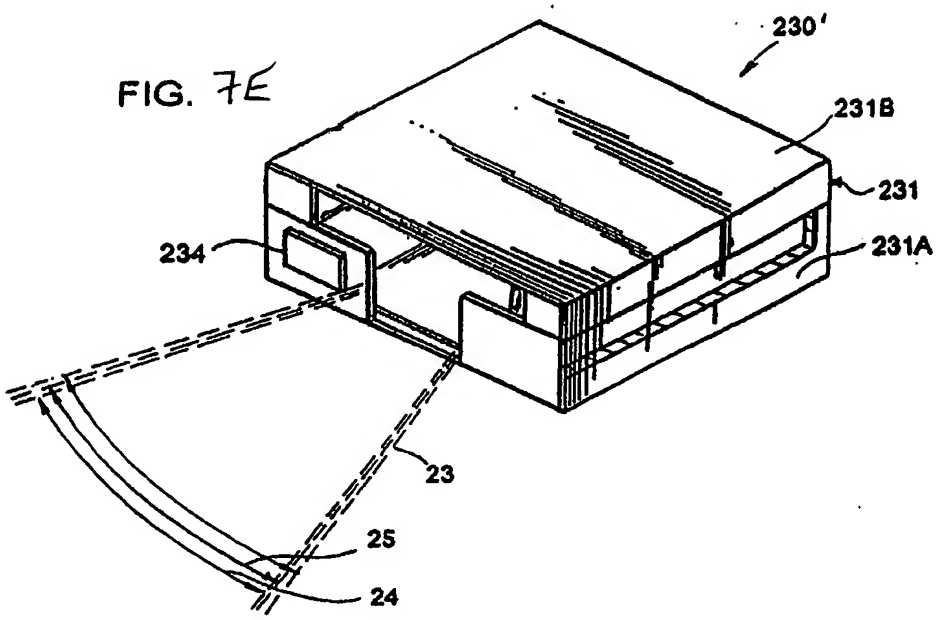
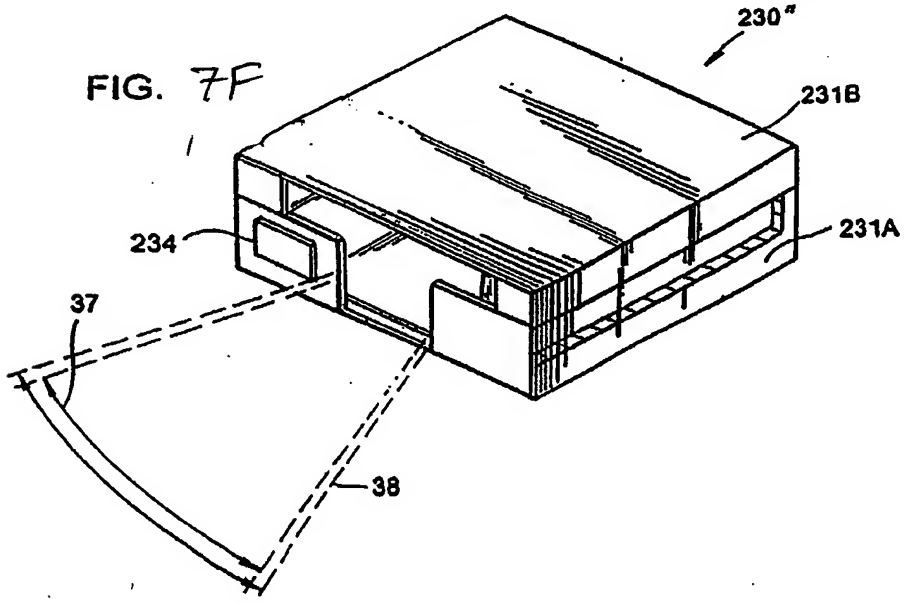


FIG. 7F



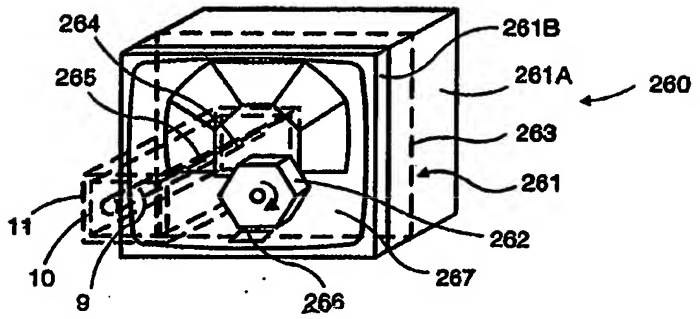


FIG. 8A

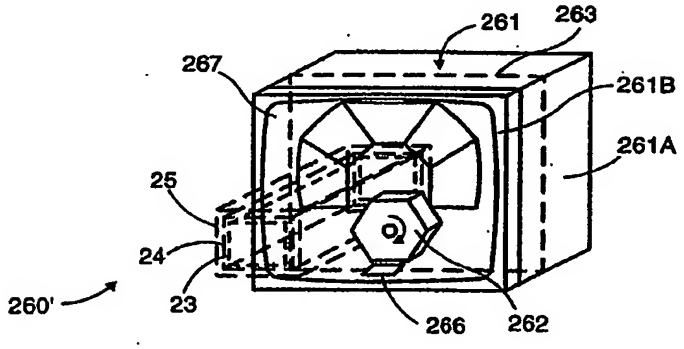


FIG. 8B

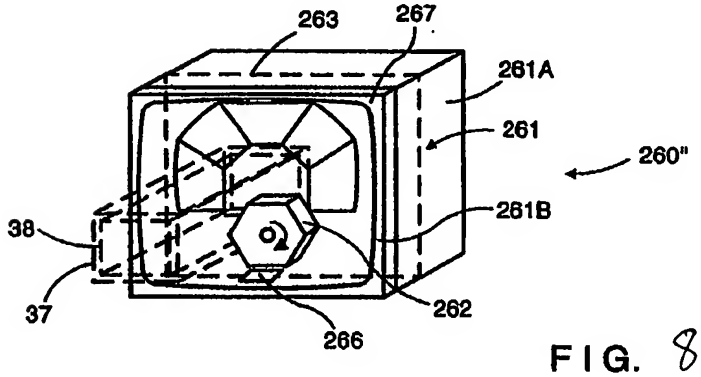


FIG. 8C

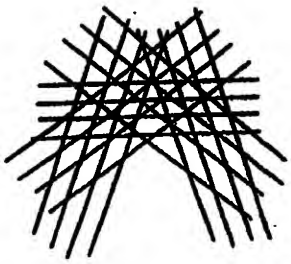


FIG. 9A

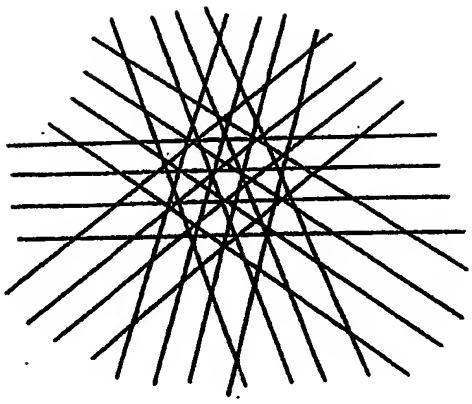


FIG. 9B

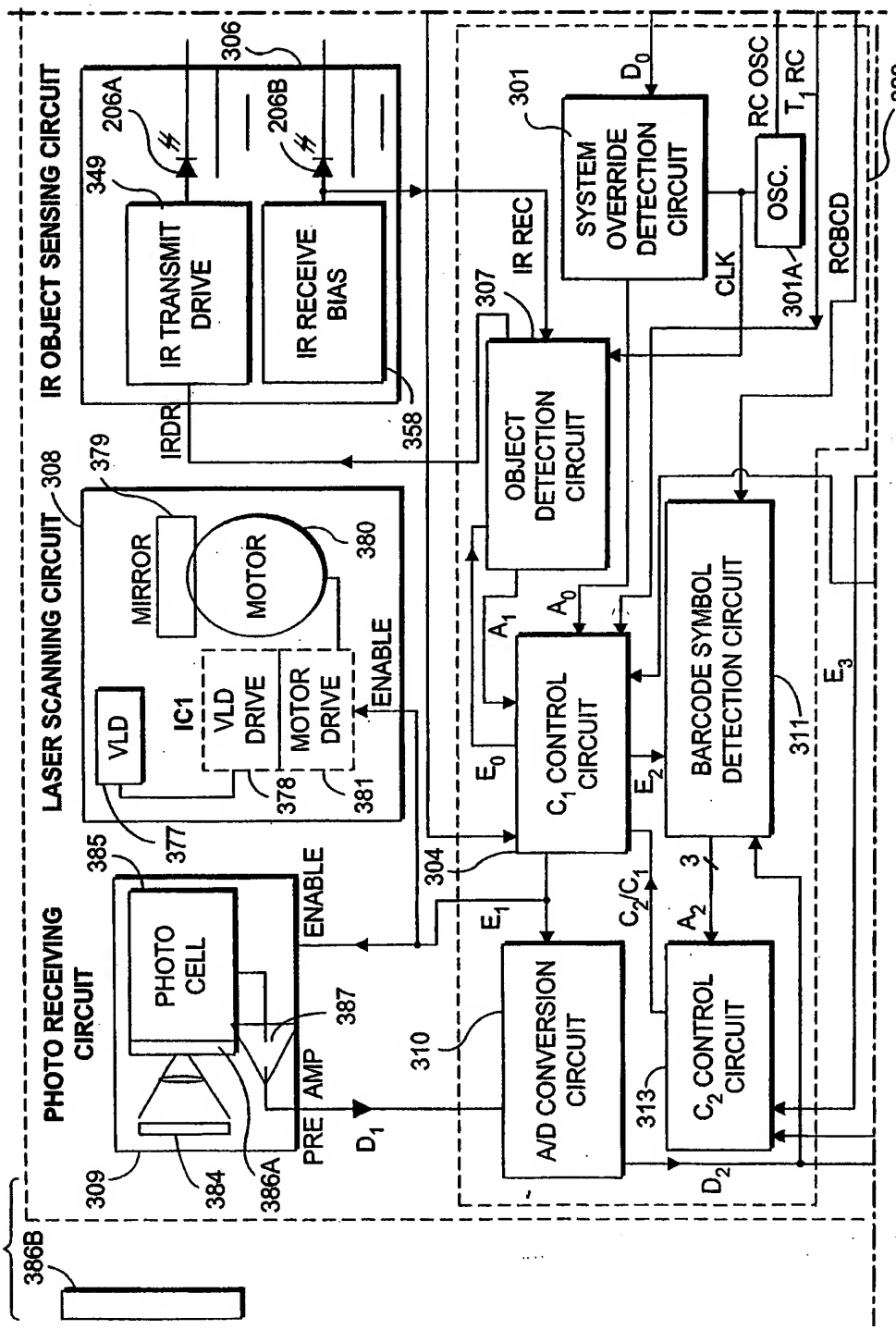


PHOTO RECEIVING CIRCUIT
LASER SCANNING CIRCUIT
IR OBJECT SENSING CIRCUIT
386B
309
384
386A
PHOTO CELL
385
377
PRE AMP
387
ENABLE
D1
310
A/D CONVERSION CIRCUIT
304
E1
313
C2 CONTROL CIRCUIT
D2
C2/C1
A2
3
BARCODE SYMBOL DETECTION CIRCUIT
311
E3
E2
C1 CONTROL CIRCUIT
E0
A1
A0
OBJECT DETECTION CIRCUIT
307
IR REC
SYSTEM OVERRIDE DETECTION CIRCUIT
301
D0
CLK
OSC.
RC OSC
T1 RC
301A
RCBCD
333
VLD
IC1
VLD DRIVE
MOTOR DRIVE
ENABLE
MIRROR
MOTOR
379
380
378
381
308
IRDR
358
IR TRANSMIT DRIVE
IR RECEIVE BIAS
349
206A
206B
306
790

FIG. 1bA1

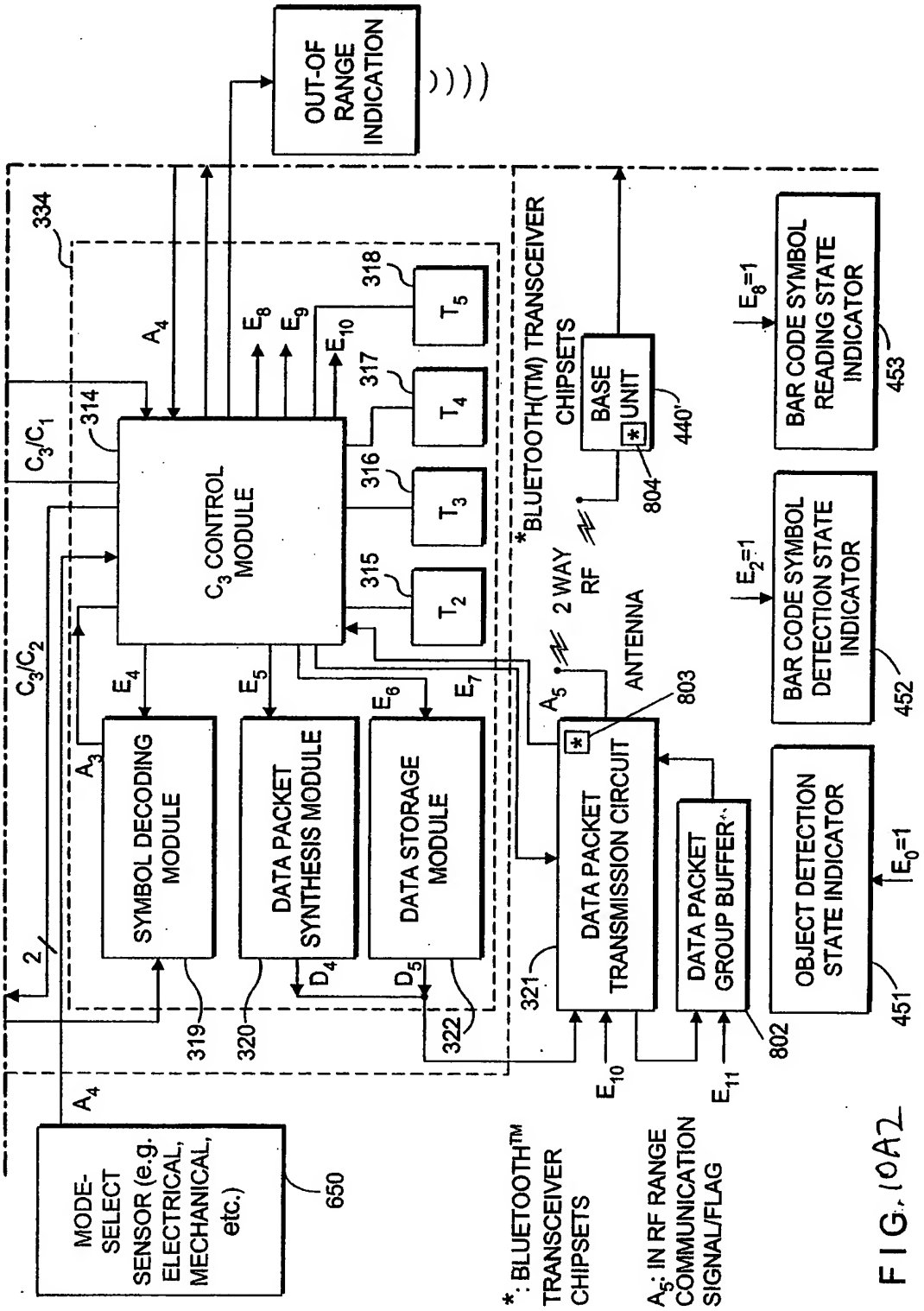

OUT-OF RANGE INDICATION
334
C_3/C_1
314
A_4
E_8
E_9
E_{10}
318
317
316
315
T_5
T_4
T_3
T_2
C_3 CONTROL MODULE
C_3/C_2
E_4
E_5
E_6
E_7
A_3
SYMBOL DECODING MODULE
DATA PACKET SYNTHESIS MODULE
DATA STORAGE MODULE
2
D_4
D_5
319
320
322
*BLUETOOTH(TM) TRANSCEIVER CHIPSETS
BASE UNIT *
440'
804
2 WAY RF
ANTENNA
A_5
803
DATA PACKET TRANSMISSION CIRCUIT *
321
DATA PACKET GROUP BUFFER
802
E_{10}
E_{11}
E_8=1
BAR CODE SYMBOL READING STATE INDICATOR
453
E_2=1
BAR CODE SYMBOL DETECTION STATE INDICATOR
452
OBJECT DETECTION STATE INDICATOR
E_0=1
451
A_4
MODE-SELECT SENSOR (e.g. ELECTRICAL, MECHANICAL, etc.)
650
*: BLUETOOTH™ TRANSCEIVER CHIPSETS
A_5: IN RF RANGE COMMUNICATION SIGNAL/FLAG

FIG. 10A2

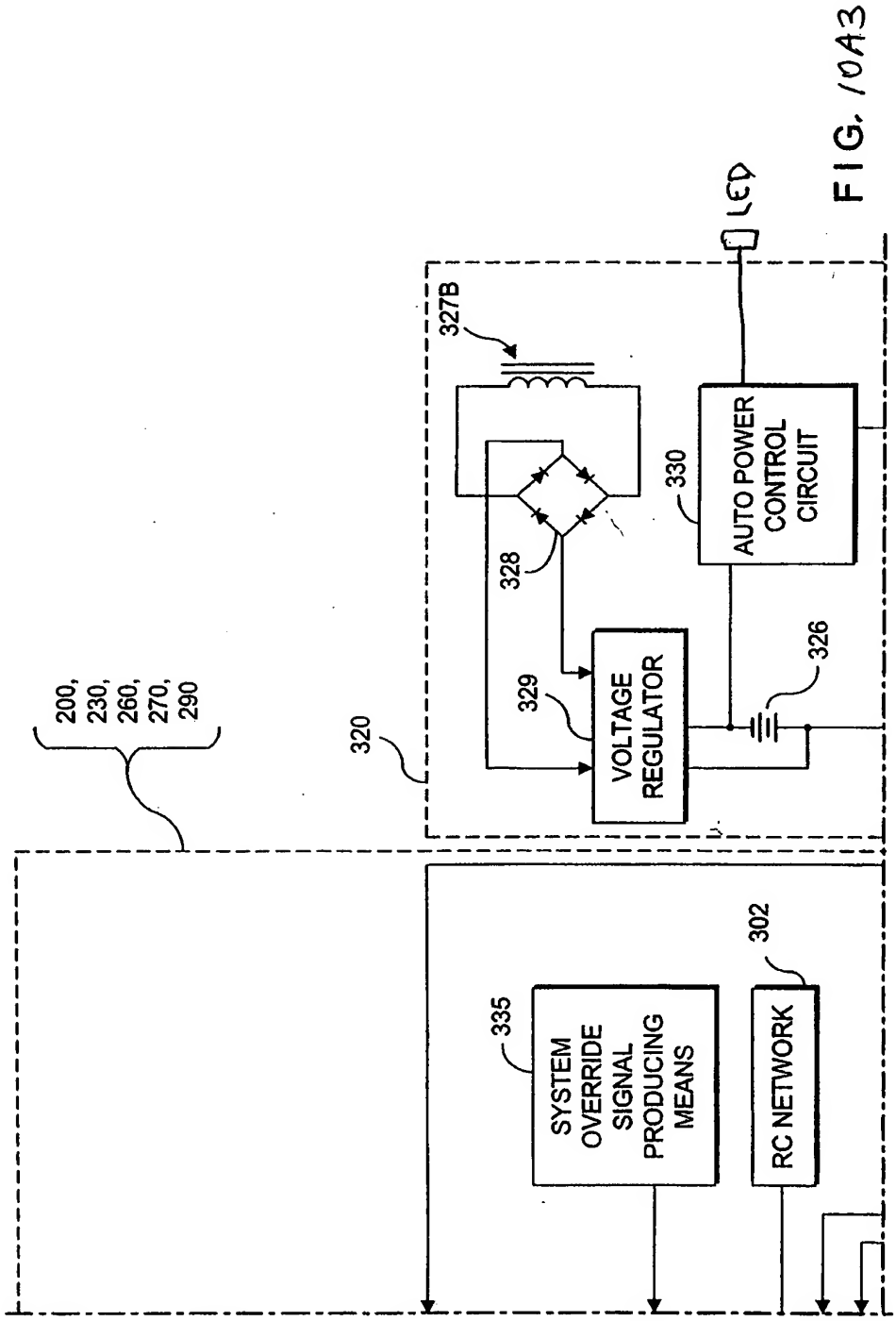

200,
230,
260,
270,
290
320
327B
328
329
330
326
LED
VOLTAGE REGULATOR
AUTO POWER CONTROL CIRCUIT
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
302
RC NETWORK

FIG. 10A3

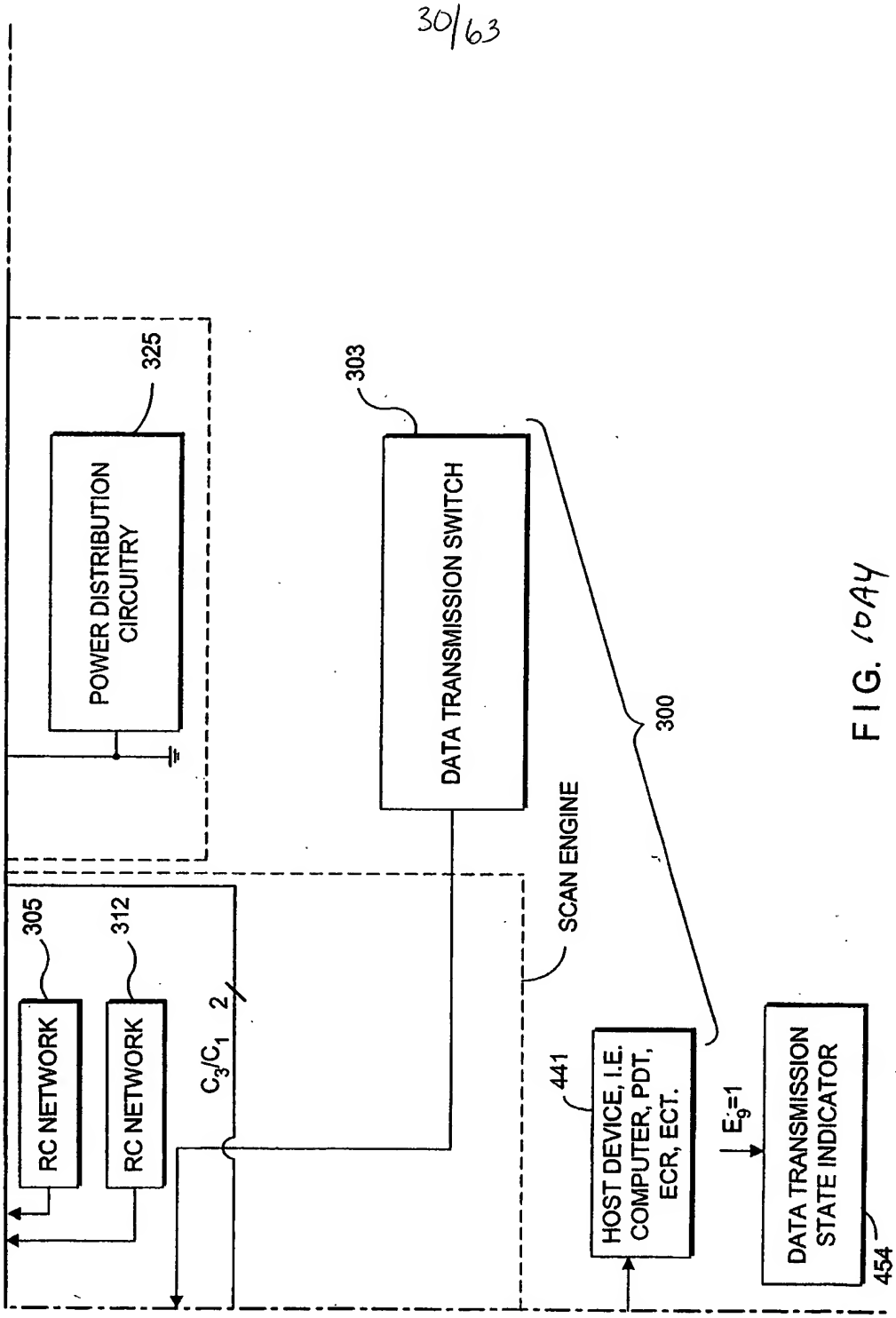

POWER DISTRIBUTION CIRCUITRY
325
303
DATA TRANSMISSION SWITCH
300
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_3/C_1 2
441
HOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_9=1
DATA TRANSMISSION STATE INDICATOR
454

FIG. 10A

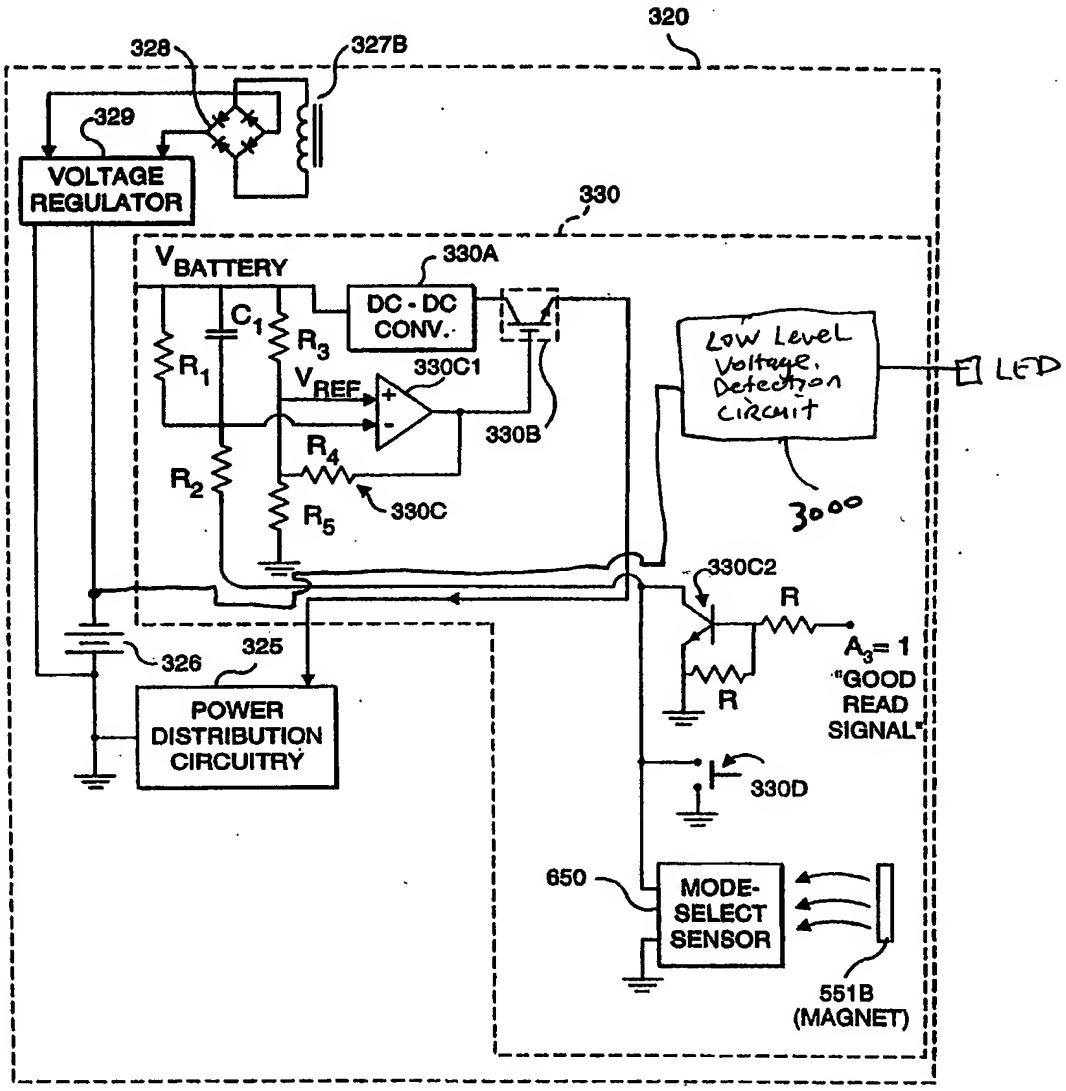

320
328
327B
329
VOLTAGE REGULATOR
330
$V_{BATTERY}$
330A
DC - DC CONV.
C_1
R_1
R_3
V_{REF}
330C1
330B
R_2
R_4
R_5
330C
Low Level Voltage Detection CIRCUIT
LED
3000
330C2
R
R
A_3 = 1 "GOOD READ SIGNAL"
326
325
POWER DISTRIBUTION CIRCUITRY
330D
650
MODE-SELECT SENSOR
551B (MAGNET)

FIG. 10B1

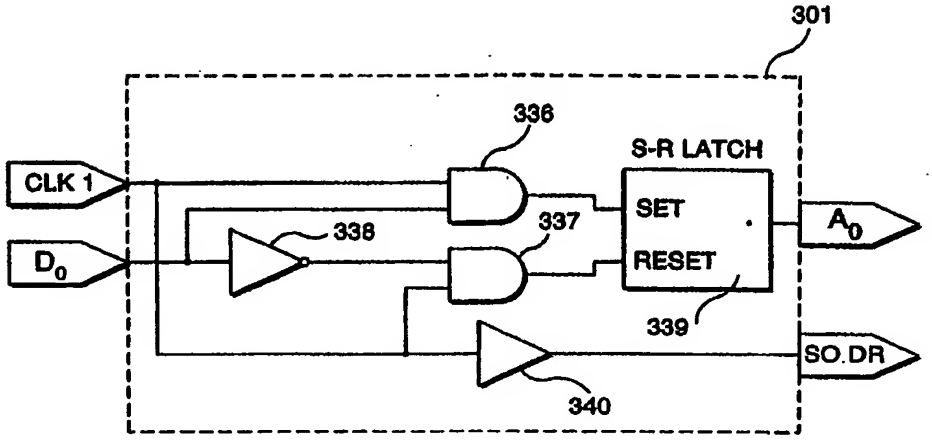


FIG. 10B2

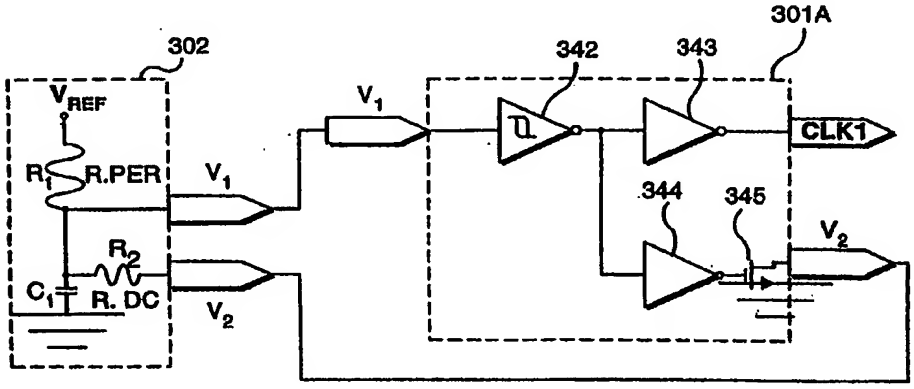


FIG. 10C

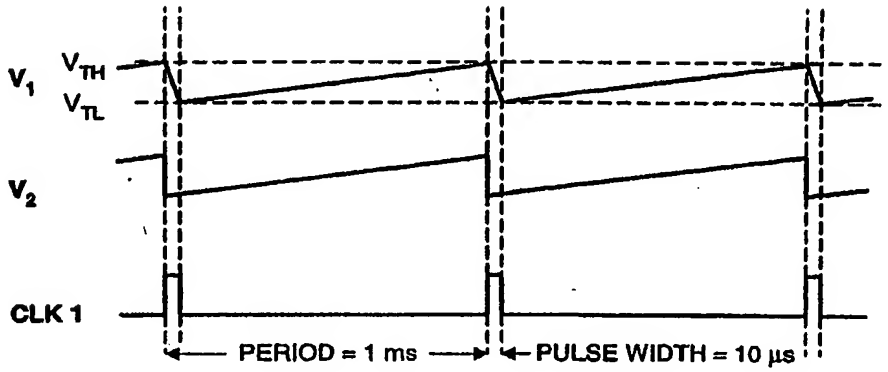


FIG 10D

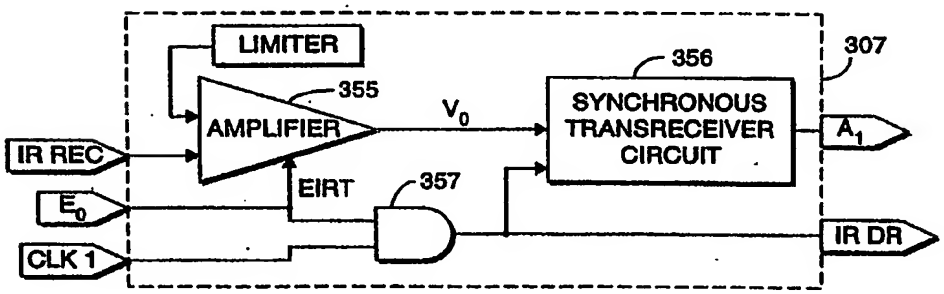


FIG. 10E

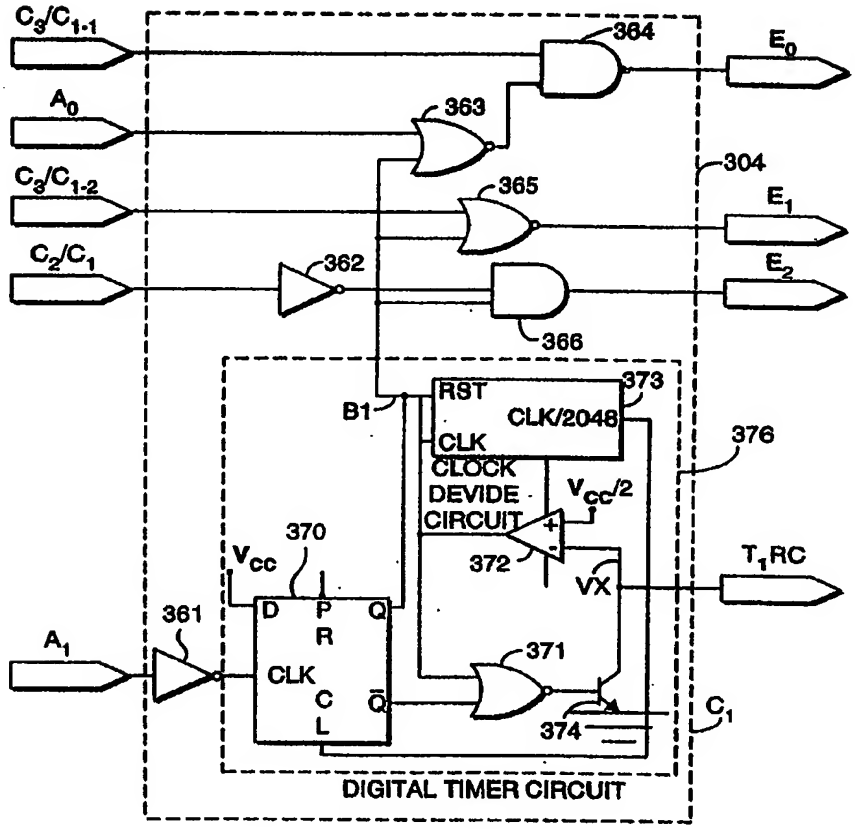

C_3/C_{1-1}
A_0
C_3/C_{1-2}
C_2/C_1
A_1
364
363
365
362
366
304
E_0
E_1
E_2
373
RST
CLK/2048
CLK
CLOCK
DEVIDE
CIRCUIT
B1
376
$V_{cc}/2$
372
VX
T_1RC
370
V_{cc}
361
D
P
R
Q
CLK
C
L
$\bar{Q}$
371
374
C_1
DIGITAL TIMER CIRCUIT

FIG. 10F

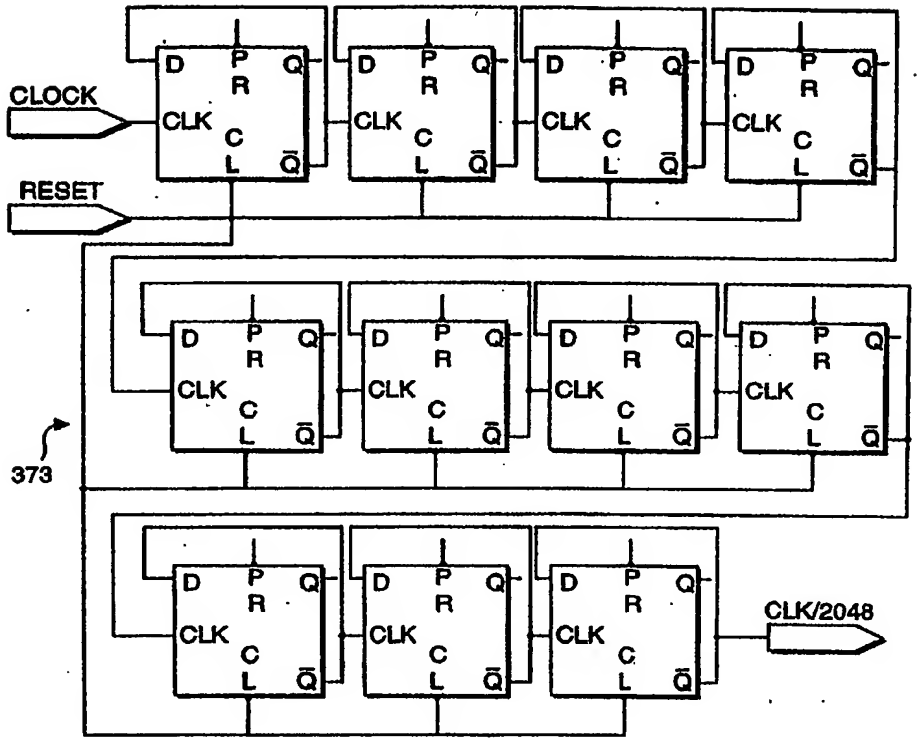


FIG. 106

$$E_0 = \overline{(B1 + A_0)(C_3 / C_{1-1})}$$

$$E_1 = (C_3 / C_{1-2}) + B1$$

$$E_2 = (C_2 / C_1)(T_1)$$

FIG. 10H

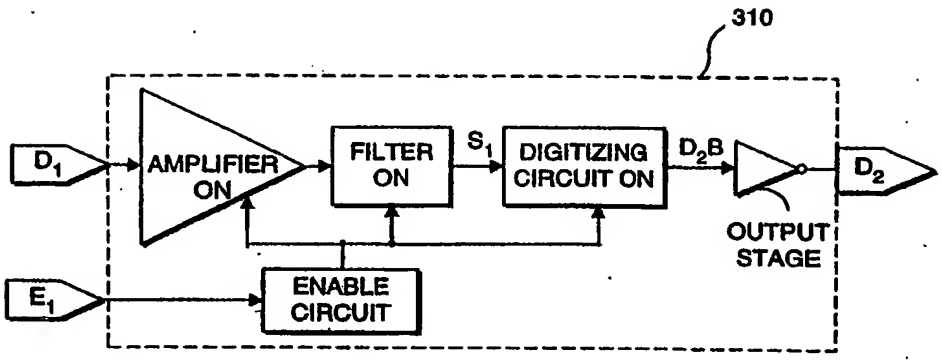


FIG. 10I

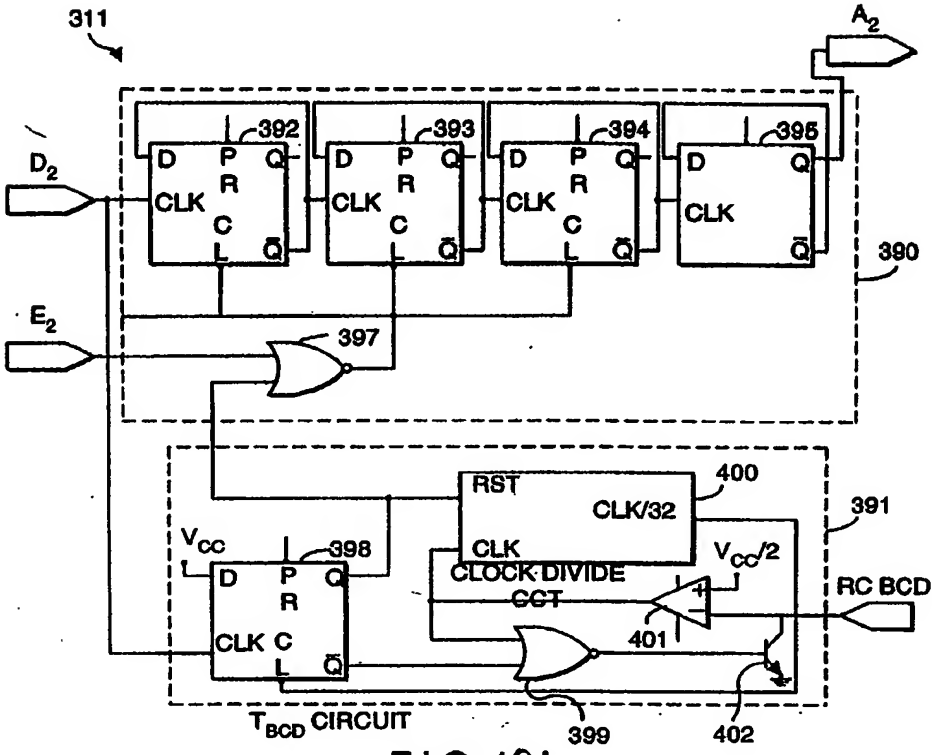


FIG. 10J

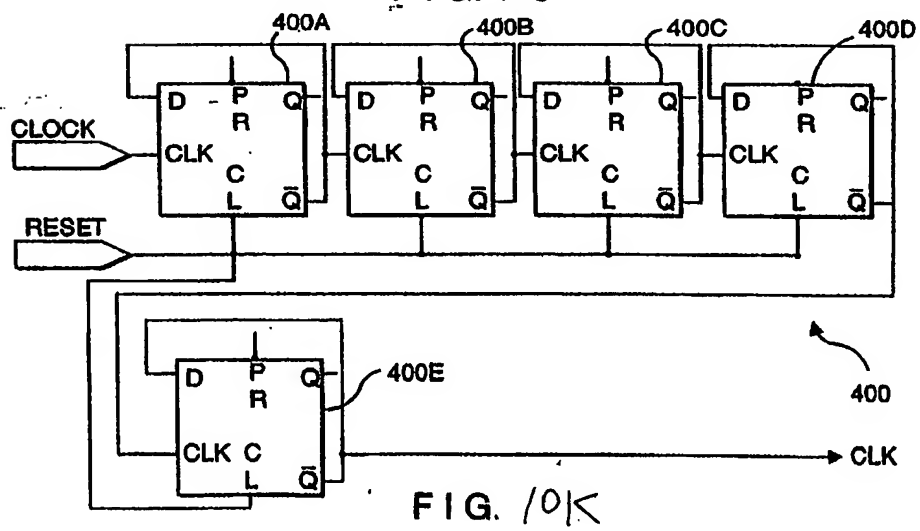


FIG. 10K

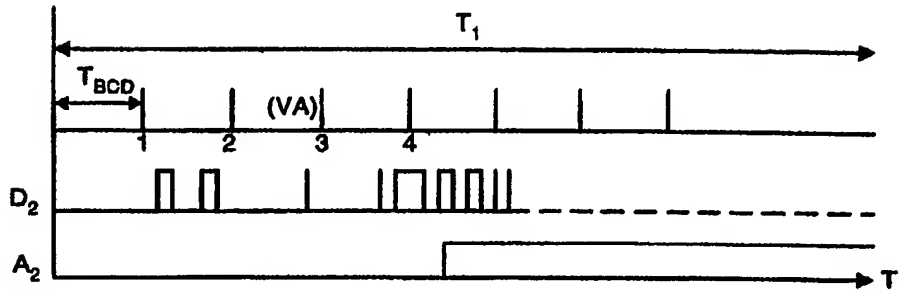


FIG. 10L

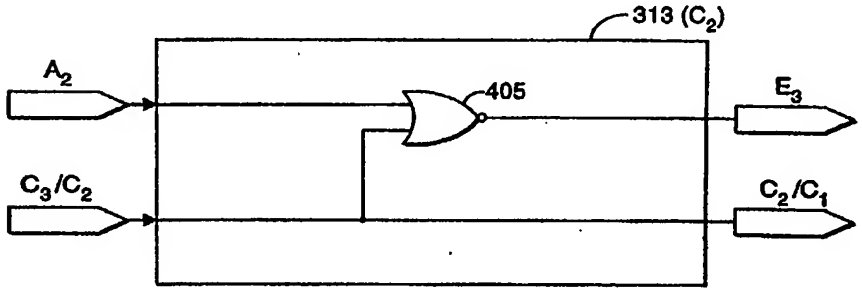


FIG. 10M

C_3 / C_2	A_2	E_3	C_2 / C_1
0	0	0	0
0	1	1	0
1	X	1	1

X: DON'T CARE (I.E. C_3 / C_2 OVERRIDES A_2)

FIG. 10N

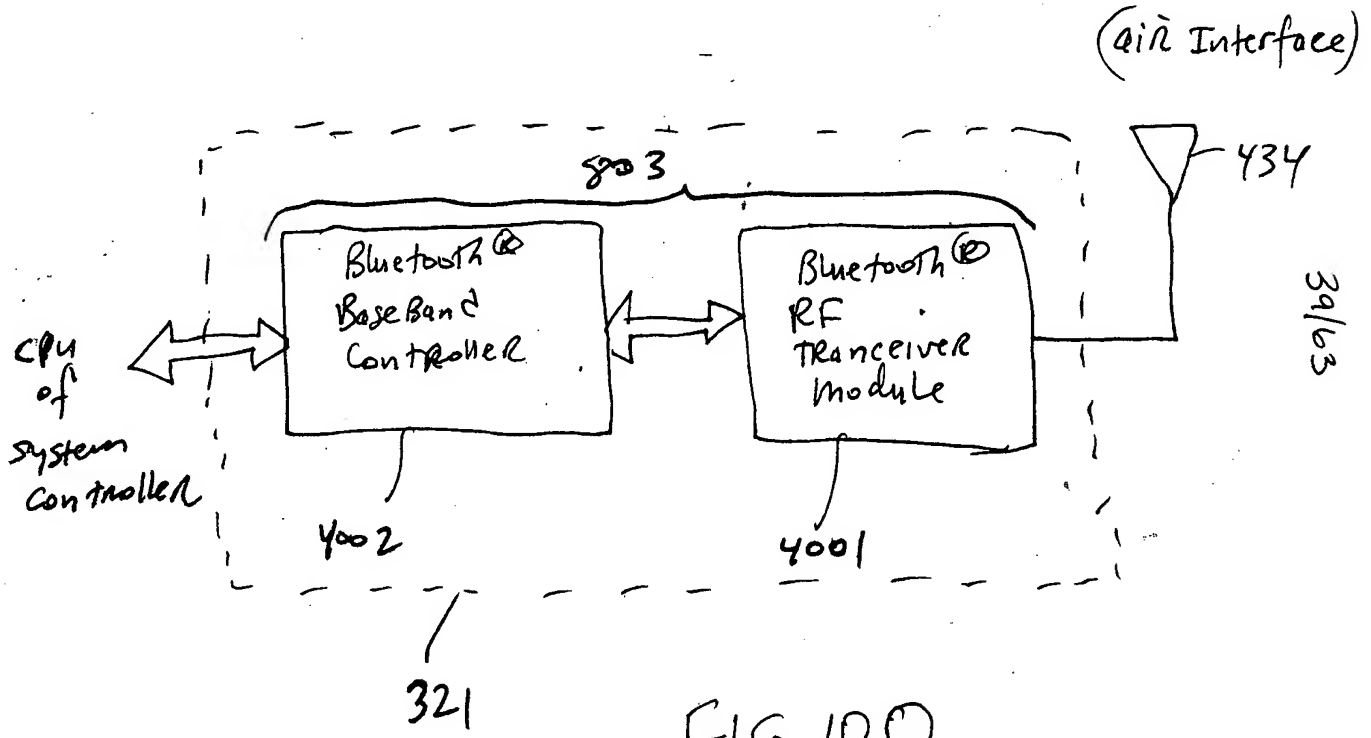

(air Interface)
434
400 3
Bluetooth
Baseband
Controller
Bluetooth
RF
Transceiver
Module
CPU
of
System
Controller
4002
4001
321
39/63

FIG. 10

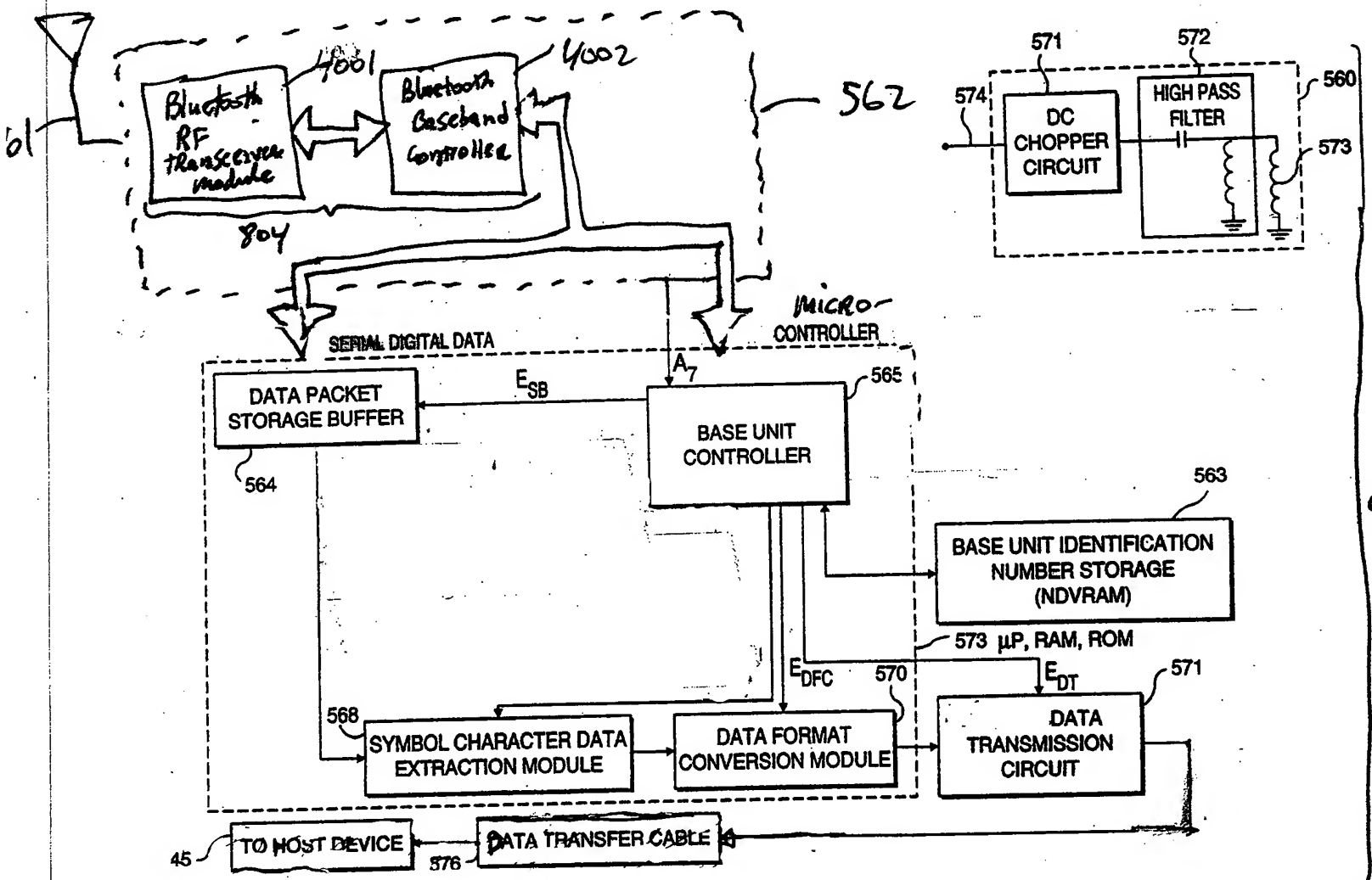

61
4001
4002
562
Bluetooth RF transceiver module
Bluetooth Baseband Controller
804
571
572
574
DC CHOPPER CIRCUIT
HIGH PASS FILTER
560
573
MICRO-CONTROLLER
SERIAL DIGITAL DATA
A7
DATA PACKET STORAGE BUFFER
ESB
565
BASE UNIT CONTROLLER
564
563
BASE UNIT IDENTIFICATION NUMBER STORAGE (NDVRAM)
573 µP, RAM, ROM
EDFC
570
EDT
571
568
SYMBOL CHARACTER DATA EXTRACTION MODULE
DATA FORMAT CONVERSION MODULE
DATA TRANSMISSION CIRCUIT
45
TO HOST DEVICE
576
DATA TRANSFER CABLE
40/63
42

FIG. 11

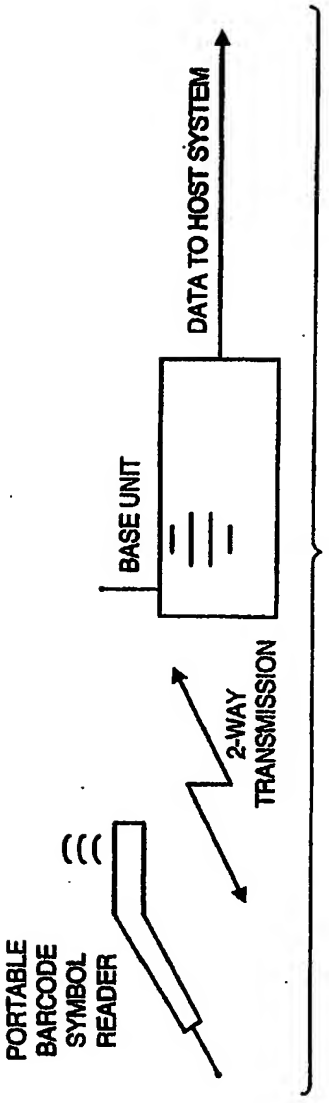

PORTABLE BARCODE SYMBOL READER
2-WAY TRANSMISSION
BASE UNIT
DATA TO HOST SYSTEM

FIG. 12

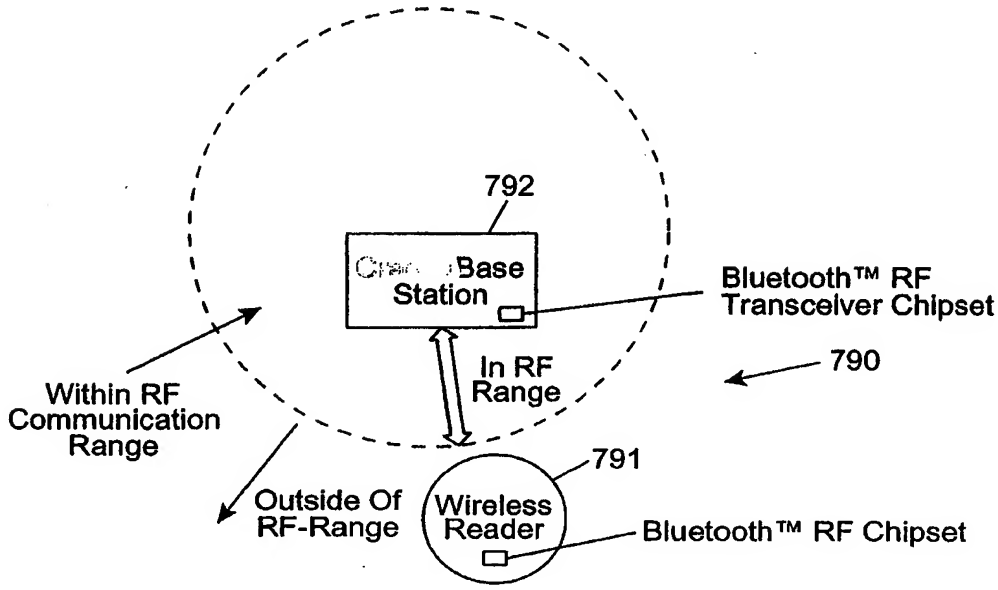


FIG. 13A1

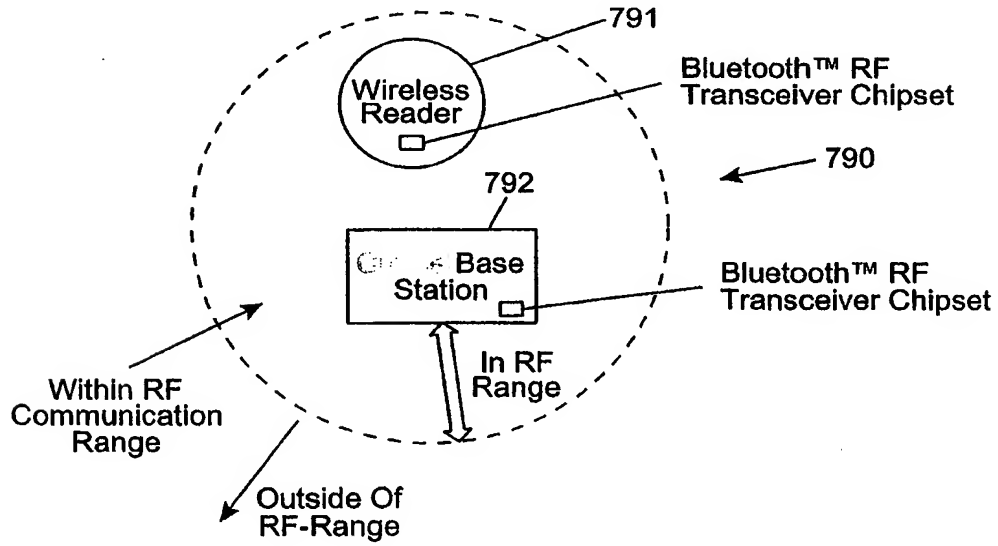


FIG. 13A2

DATA PACKET TRANSMISSION VIA 2-WAY RF WITH AUTOMATIC RF-RANGE DEPENDENT CONTROL

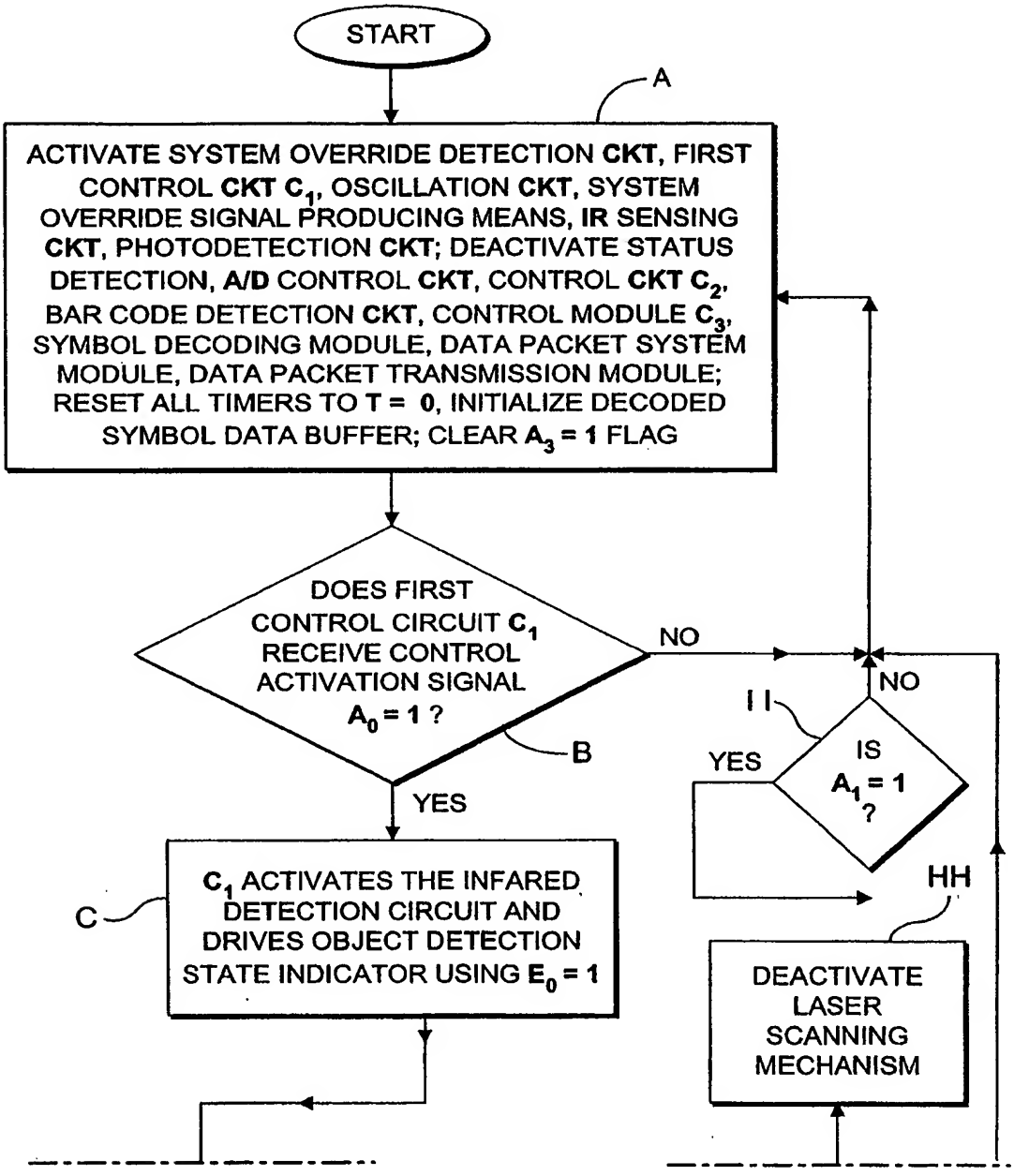


FIG. 14A1

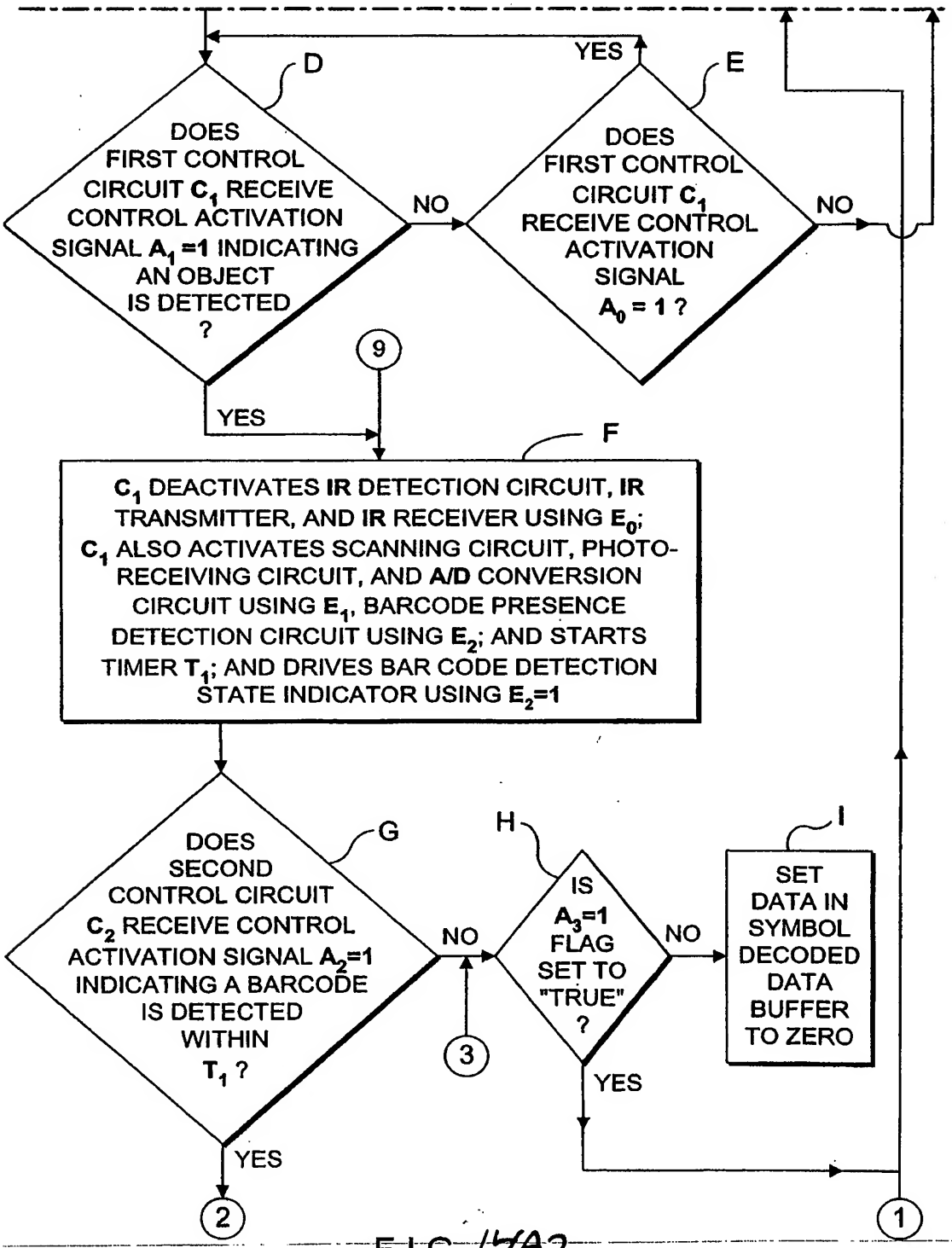

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
YES
9
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE PRESENCE DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
YES
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
YES
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
3
2
1

FIG. 14A2

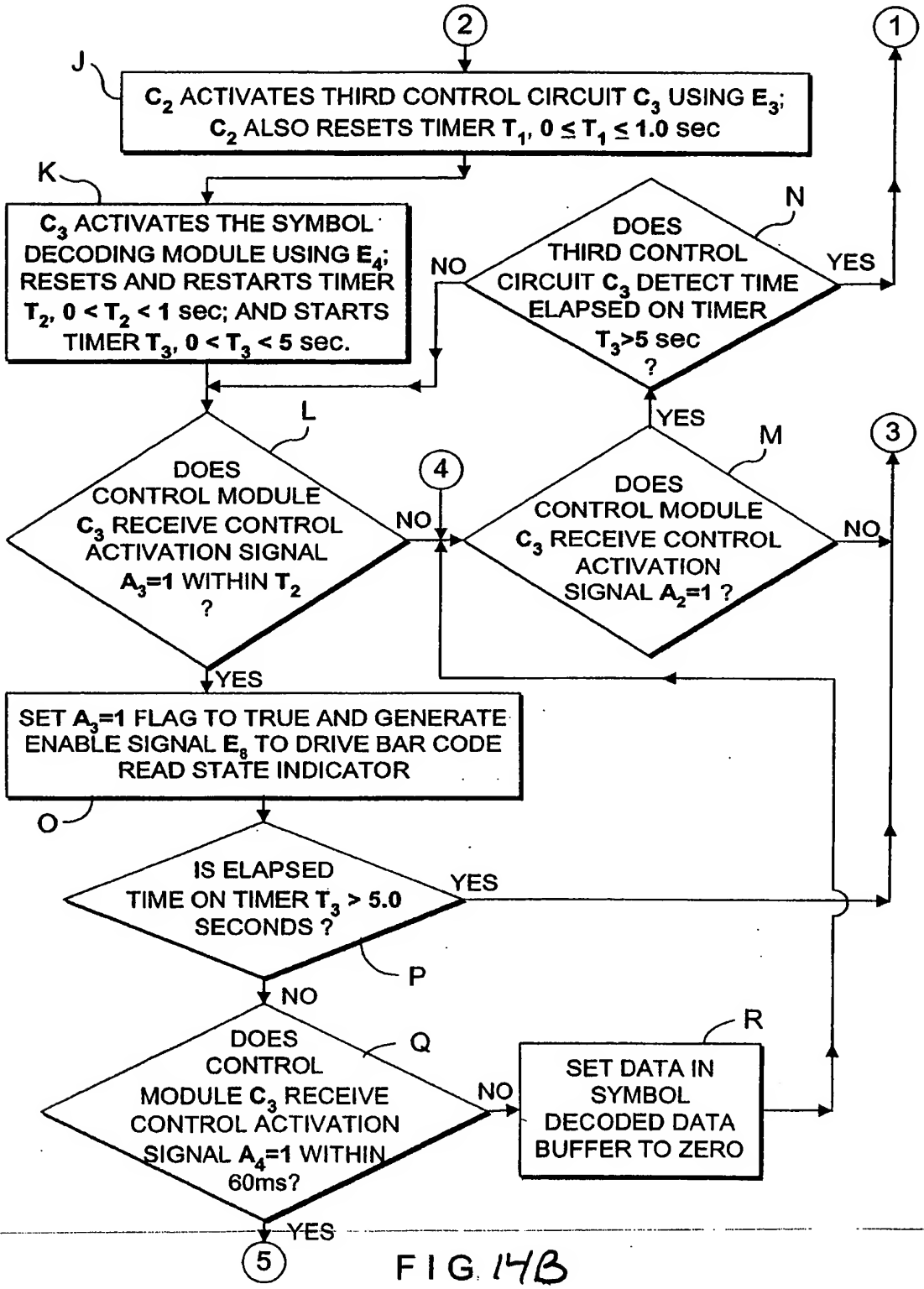

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
4
NO
YES
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
3
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 14B

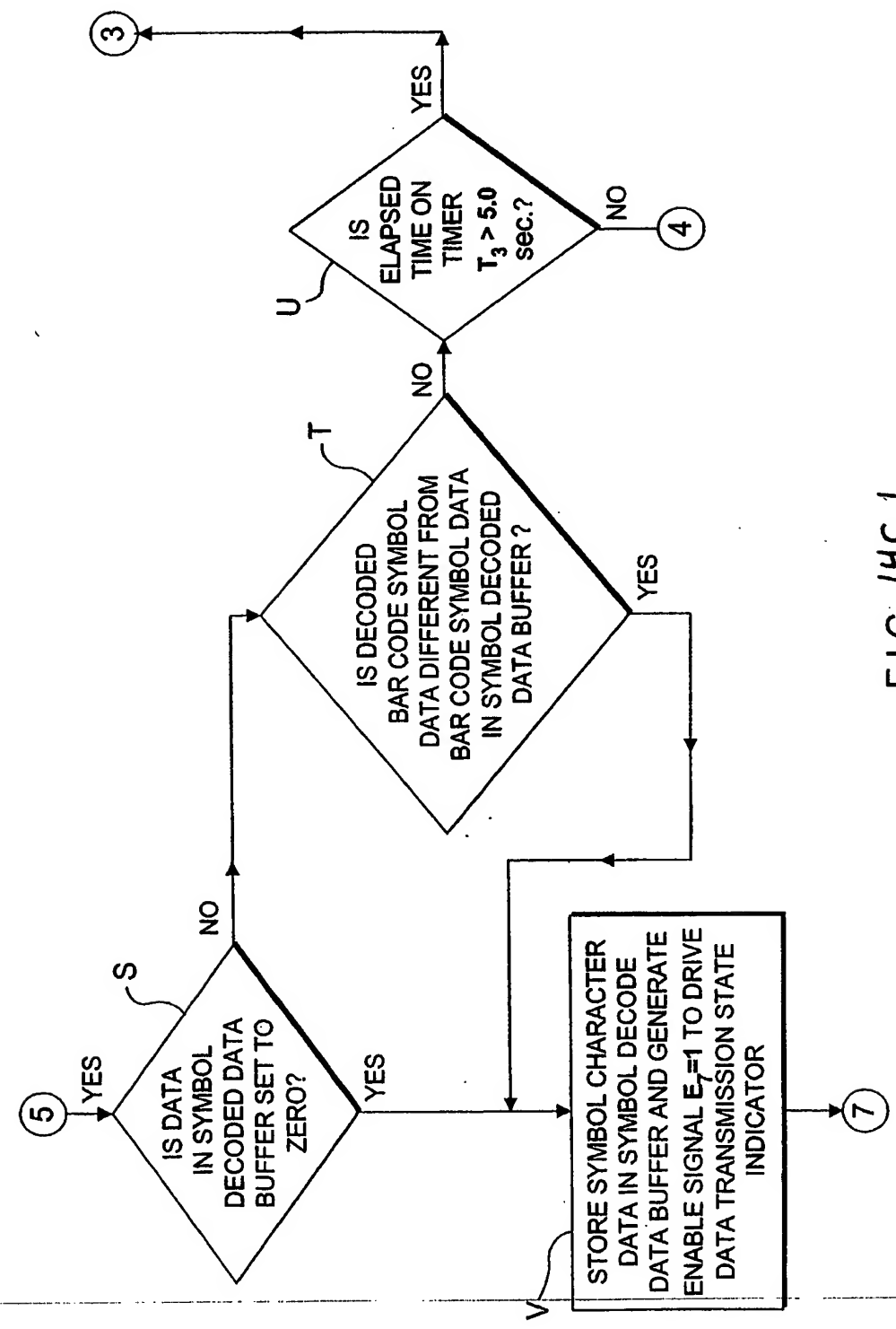

5
YES
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
S
NO
YES
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER?
T
NO
YES
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
U
YES
NO
4
3
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
V
7

FIG. 14C1

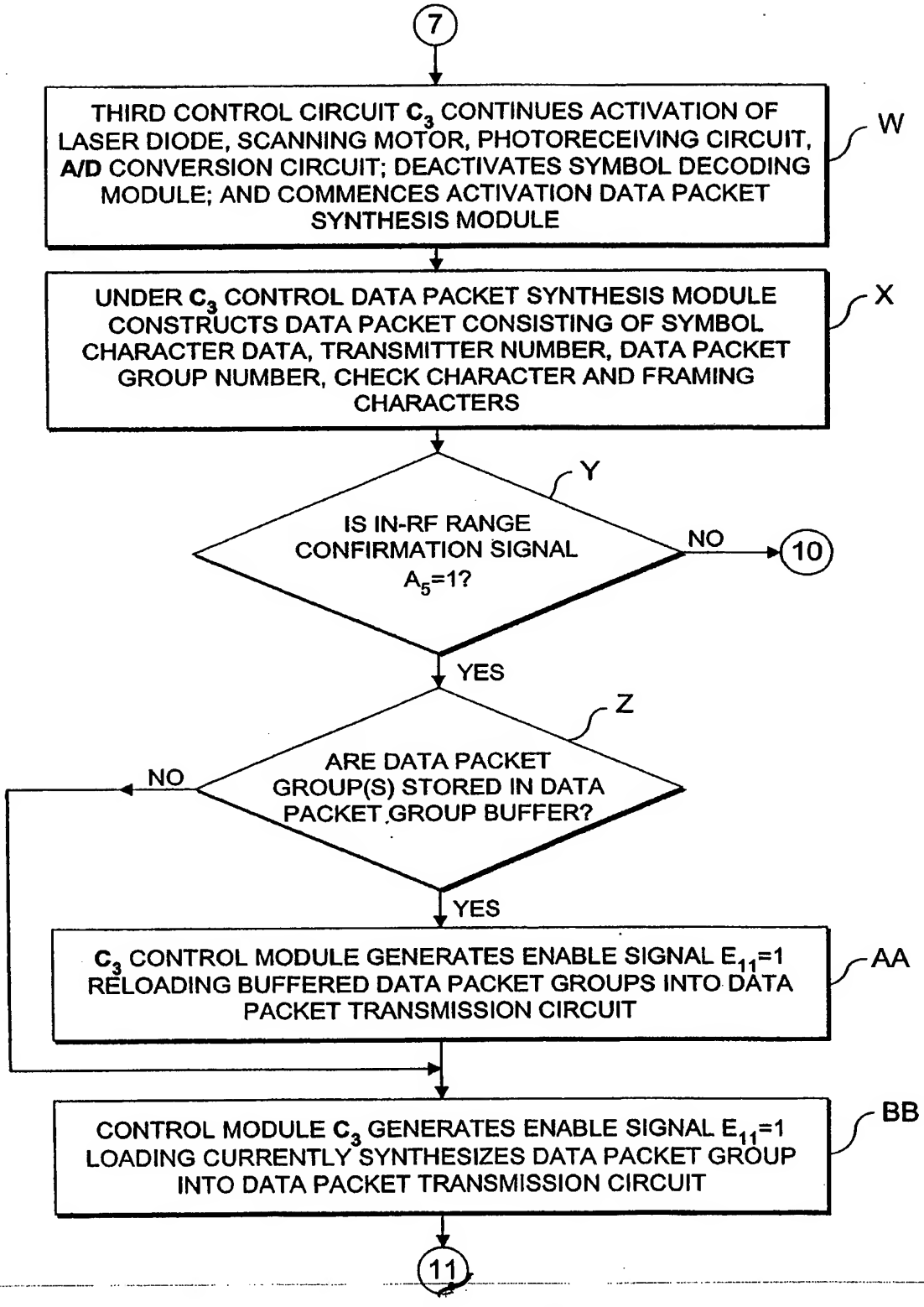

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
X
Y
IS IN-RF RANGE CONFIRMATION SIGNAL A_5=1?
NO
10
YES
Z
ARE DATA PACKET GROUP(S) STORED IN DATA PACKET GROUP BUFFER?
NO
YES
C_3 CONTROL MODULE GENERATES ENABLE SIGNAL E_{11}=1 RELOADING BUFFERED DATA PACKET GROUPS INTO DATA PACKET TRANSMISSION CIRCUIT
AA
CONTROL MODULE C_3 GENERATES ENABLE SIGNAL E_{11}=1 LOADING CURRENTLY SYNTHESIZES DATA PACKET GROUP INTO DATA PACKET TRANSMISSION CIRCUIT
BB
11

FIG. 14C2

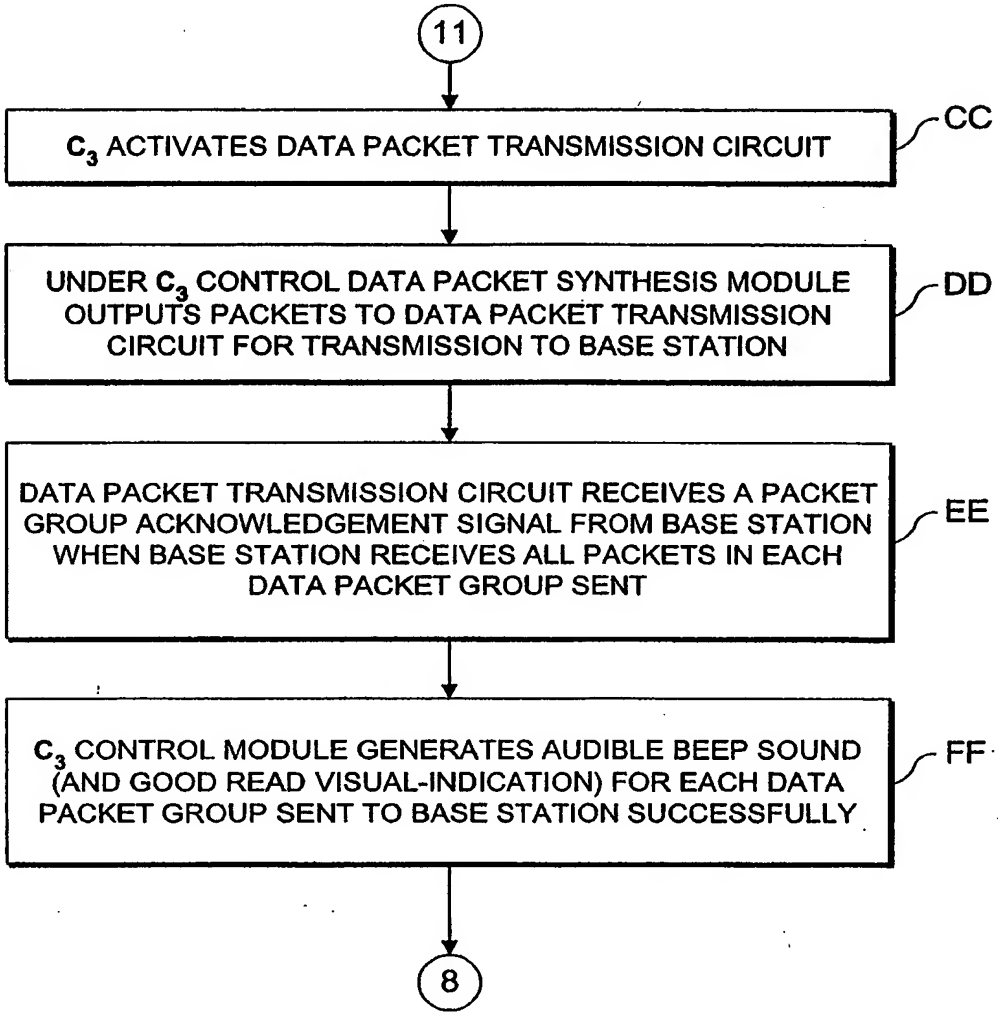

11
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
CC
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKETS TO DATA PACKET TRANSMISSION CIRCUIT FOR TRANSMISSION TO BASE STATION
DD
DATA PACKET TRANSMISSION CIRCUIT RECEIVES A PACKET GROUP ACKNOWLEDGEMENT SIGNAL FROM BASE STATION WHEN BASE STATION RECEIVES ALL PACKETS IN EACH DATA PACKET GROUP SENT
EE
C_3 CONTROL MODULE GENERATES AUDIBLE BEEP SOUND (AND GOOD READ VISUAL-INDICATION) FOR EACH DATA PACKET GROUP SENT TO BASE STATION SUCCESSFULLY
FF
8

FIG. 14C3

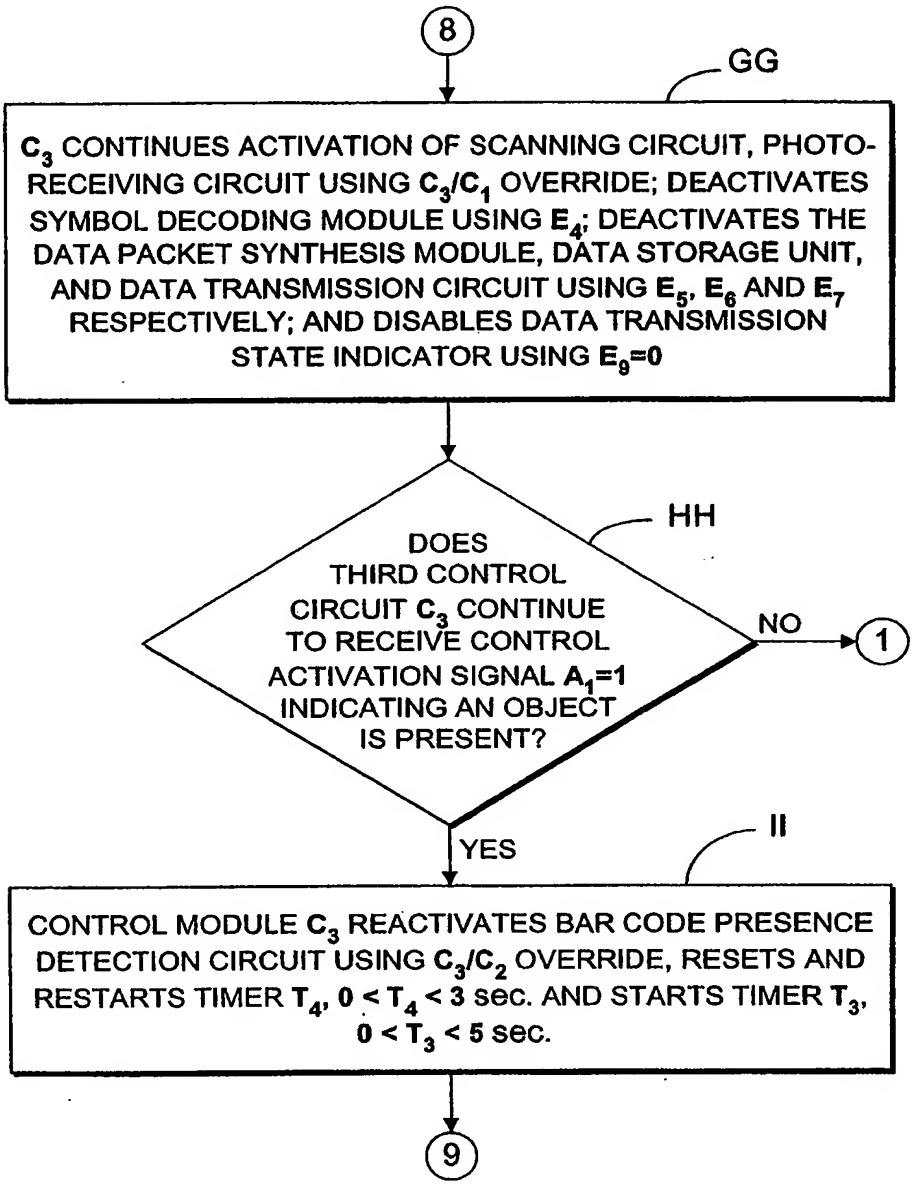

8
GG
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
HH
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT?
NO
1
YES
II
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 14C4

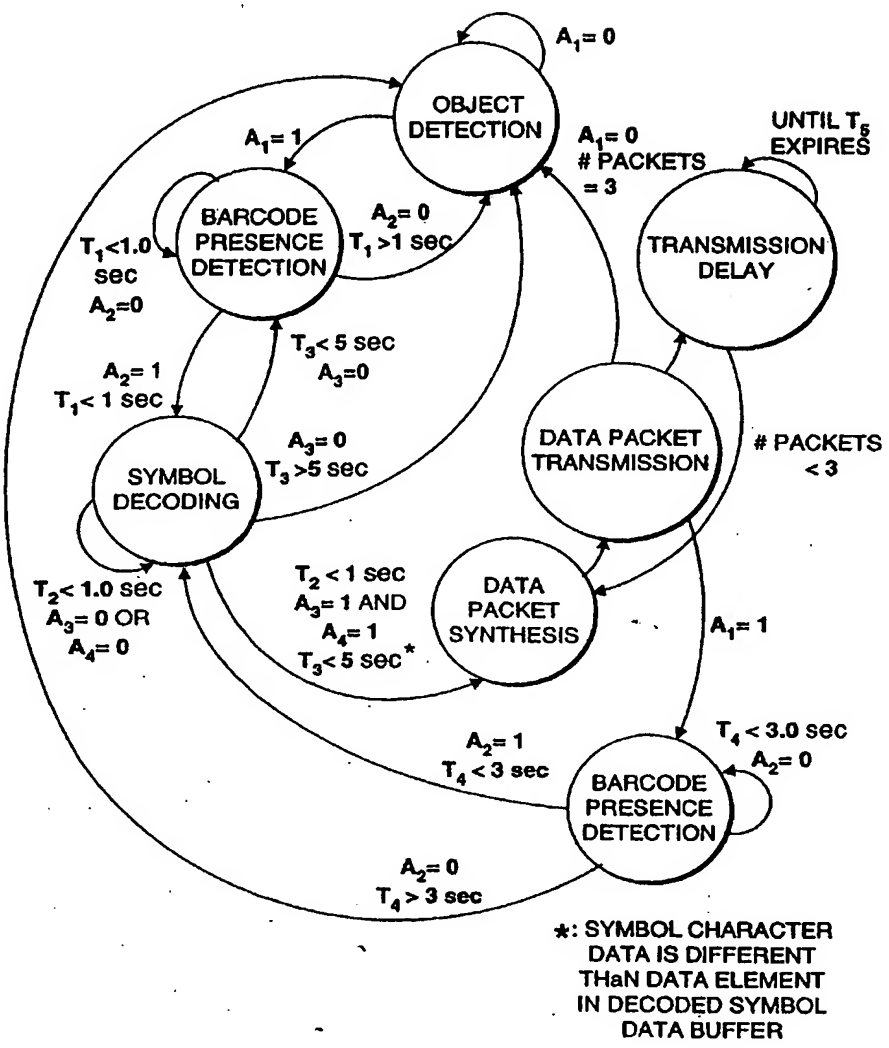

OBJECT DETECTION
$A_1 = 0$
$A_1 = 1$
$A_1 = 0$ # PACKETS = 3
UNTIL T_5 EXPIRES
BARCODE PRESENCE DETECTION
$A_2 = 0$ $T_1 > 1$ sec
$T_1 < 1.0$ sec $A_2 = 0$
TRANSMISSION DELAY
$T_3 < 5$ sec $A_3 = 0$
$A_2 = 1$ $T_1 < 1$ sec
SYMBOL DECODING
$A_3 = 0$ $T_3 > 5$ sec
DATA PACKET TRANSMISSION
PACKETS < 3
$T_2 < 1.0$ sec $A_3 = 0$ OR $A_4 = 0$
$T_2 < 1$ sec $A_3 = 1$ AND $A_4 = 1$ $T_3 < 5$ sec*
DATA PACKET SYNTHESIS
$A_1 = 1$
$A_2 = 1$ $T_4 < 3$ sec
$T_4 < 3.0$ sec $A_2 = 0$
BARCODE PRESENCE DETECTION
$A_2 = 0$ $T_4 > 3$ sec
*: SYMBOL CHARACTER DATA IS DIFFERENT THaN DATA ELEMENT IN DECODED SYMBOL DATA BUFFER

FIG. 15

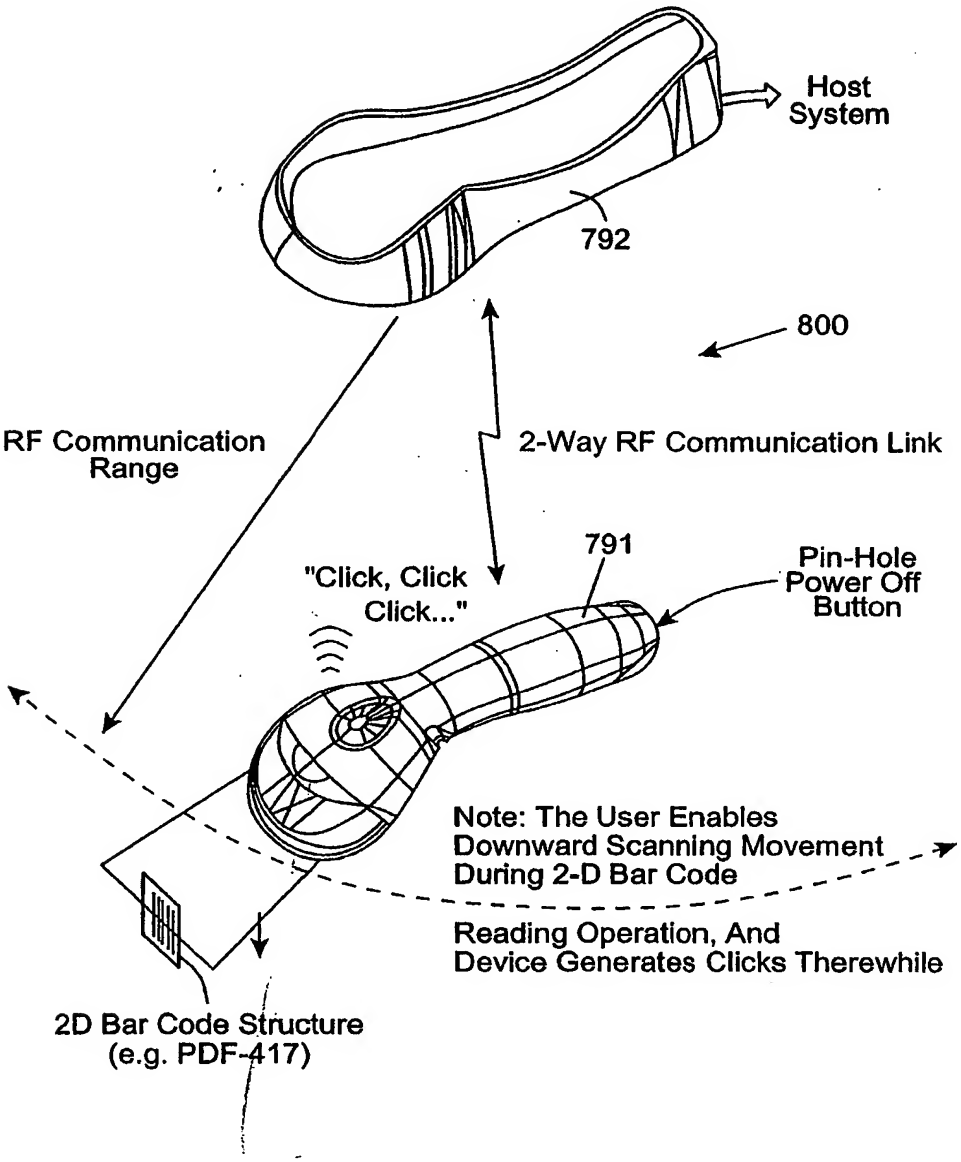

Host System
792
800
RF Communication Range
2-Way RF Communication Link
791
"Click, Click Click..."
Pin-Hole Power Off Button
Note: The User Enables Downward Scanning Movement During 2-D Bar Code
Reading Operation, And Device Generates Clicks Therewhile
2D Bar Code Structure (e.g. PDF-417)

FIG. 16

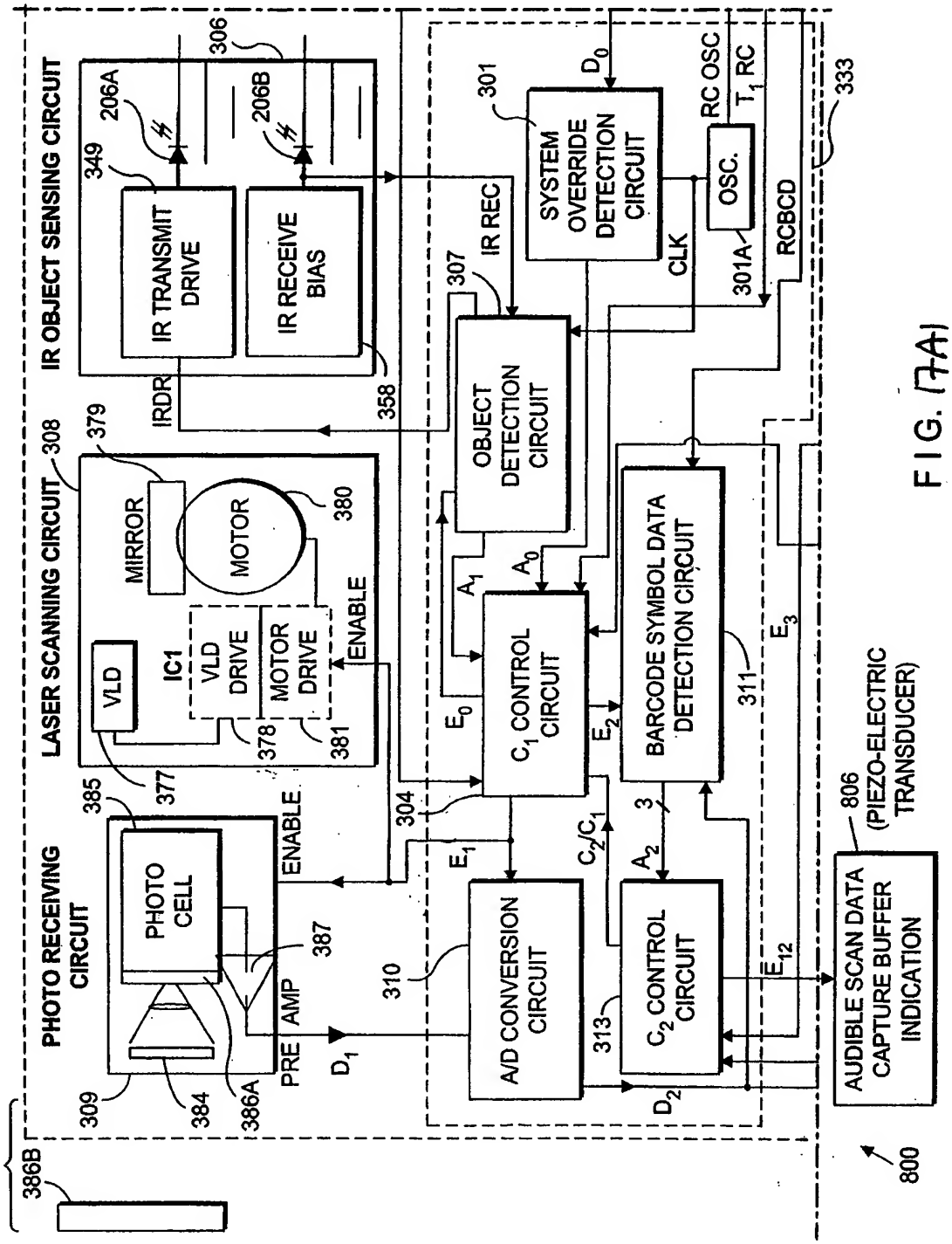


PHOTO RECEIVING CIRCUIT
LASER SCANNING CIRCUIT
IR OBJECT SENSING CIRCUIT
PHOTO CELL
AMP
PRE
ENABLE
VLD
IC1
VLD DRIVE
MOTOR DRIVE
ENABLE
MIRROR
MOTOR
IR TRANSMIT DRIVE
IR RECEIVE BIAS
IRDR
IR REC
OBJECT DETECTION CIRCUIT
SYSTEM OVERRIDE DETECTION CIRCUIT
OSC.
RC OSC
RCBCD
CLK
C_1 CONTROL CIRCUIT
BARCODE SYMBOL DATA DETECTION CIRCUIT
A/D CONVERSION CIRCUIT
C_2 CONTROL CIRCUIT
AUDIBLE SCAN DATA CAPTURE BUFFER INDICATION
(PIEZO-ELECTRIC TRANSDUCER)
309
384
386A
386B
385
377
387
379
380
378
381
206A
206B
306
349
358
307
301
301A
333
304
310
311
313
806
800
D_0
D_1
D_2
A_0
A_1
A_2
E_0
E_1
E_2
E_3
E_{12}
C_2/C_1
T_1 RC
3

FIG. 7A)

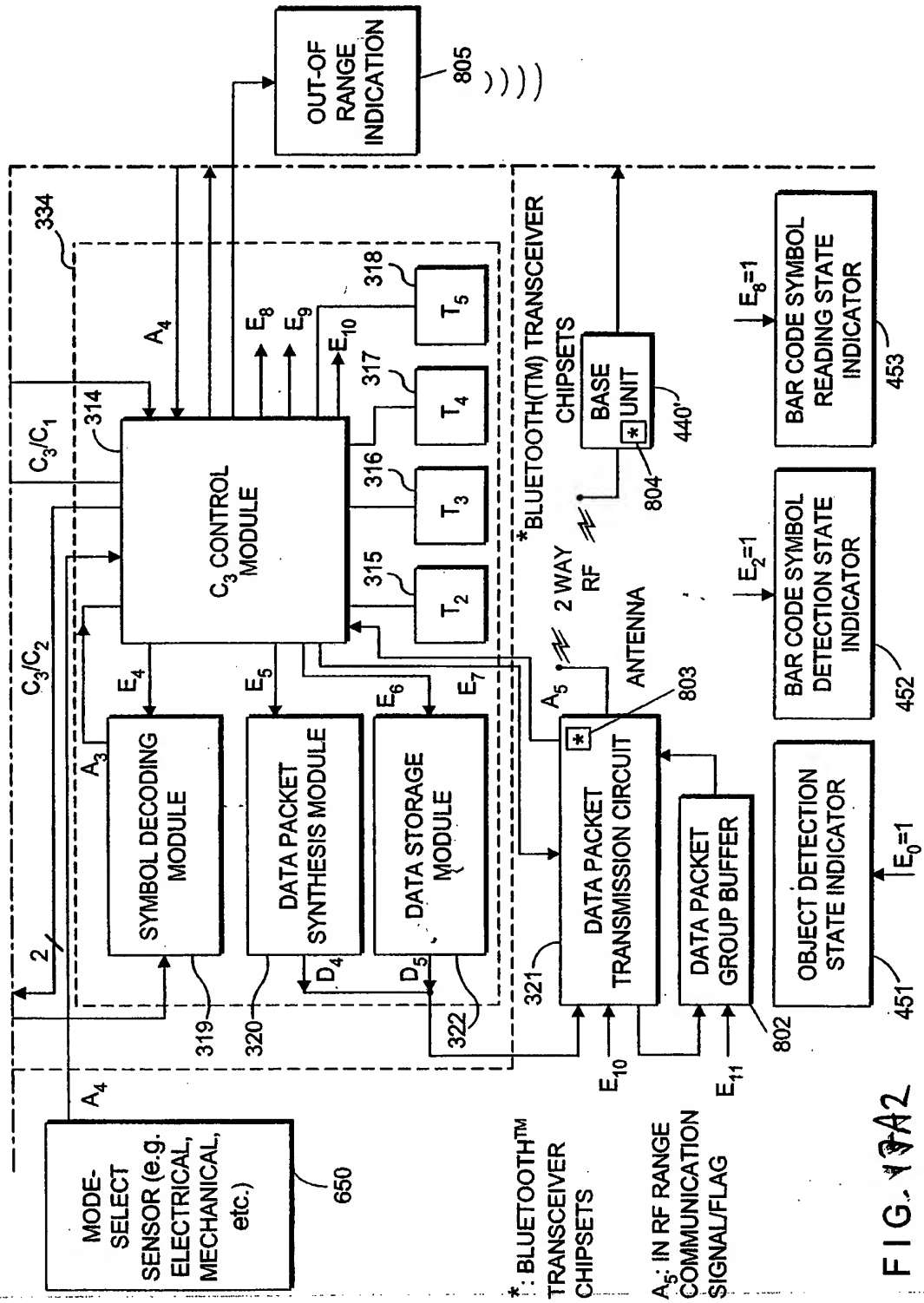

OUT-OF RANGE INDICATION
805
334
A_4
E_8
E_9
E_{10}
318
317
316
315
314
T_5
T_4
T_3
T_2
C_3/C_1
C_3 CONTROL MODULE
*BLUETOOTH(TM) TRANSCEIVER CHIPSETS
BASE UNIT
440'
804
2 WAY RF ANTENNA
803
A_5
E_4
E_5
E_6
E_7
C_3/C_2
A_3
SYMBOL DECODING MODULE
DATA PACKET SYNTHESIS MODULE
DATA STORAGE MODULE
DATA PACKET TRANSMISSION CIRCUIT
DATA PACKET GROUP BUFFER
OBJECT DETECTION STATE INDICATOR
E_0=1
451
802
E_{11}
E_{10}
321
322
320
319
D_4
D_5
2
E_2=1
BAR CODE SYMBOL DETECTION STATE INDICATOR
452
E_8=1
BAR CODE SYMBOL READING STATE INDICATOR
453
A_4
MODE-SELECT SENSOR (e.g. ELECTRICAL, MECHANICAL, etc.)
650
*: BLUETOOTH™ TRANSCEIVER CHIPSETS
A_5: IN RF RANGE COMMUNICATION SIGNAL/FLAG

FIG. 12A2

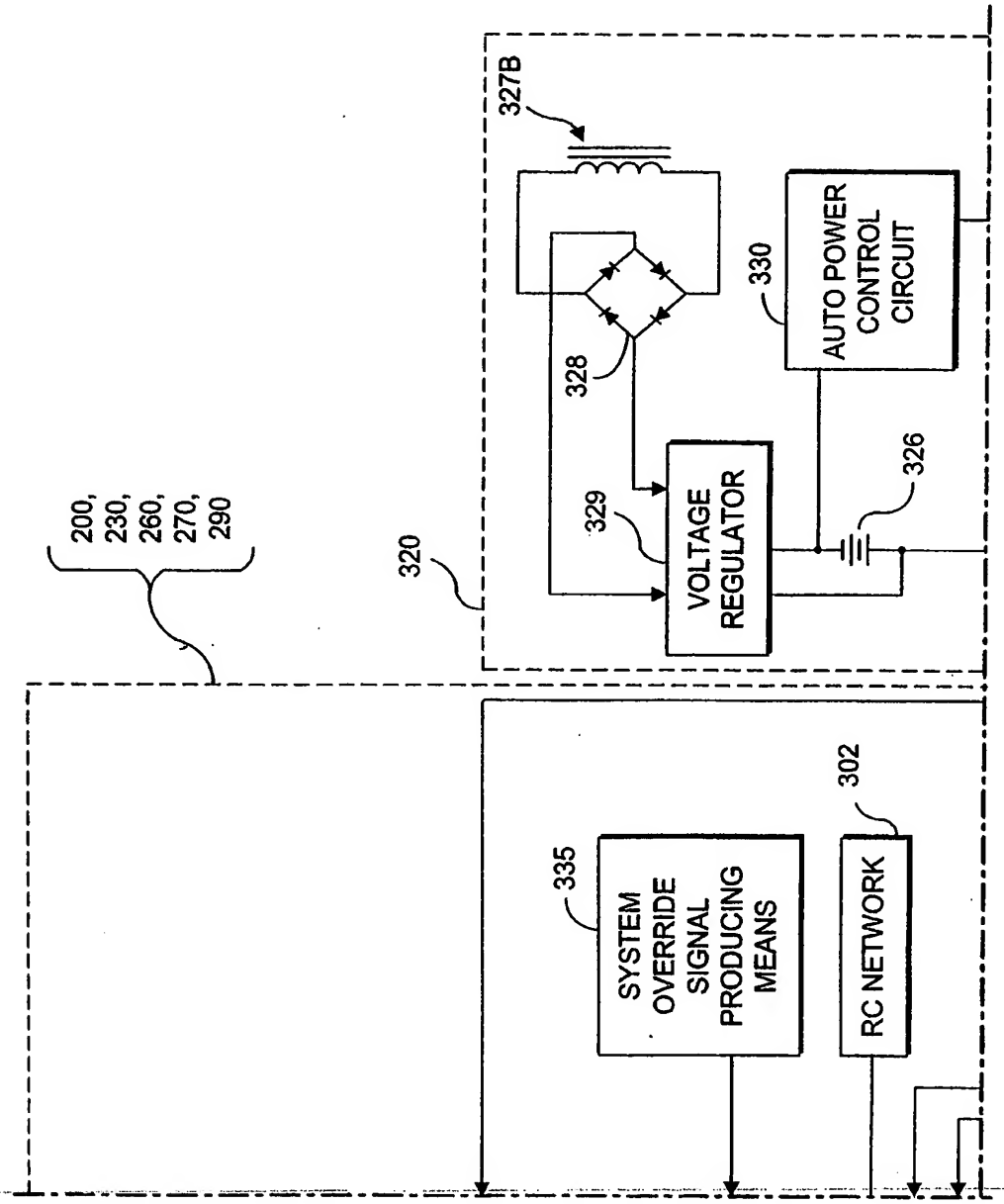

200,
230,
260,
270,
290
320
327B
328
329
330
326
VOLTAGE REGULATOR
AUTO POWER CONTROL CIRCUIT
335
SYSTEM OVERRIDE SIGNAL PRODUCING MEANS
302
RC NETWORK

FIG. 17A3

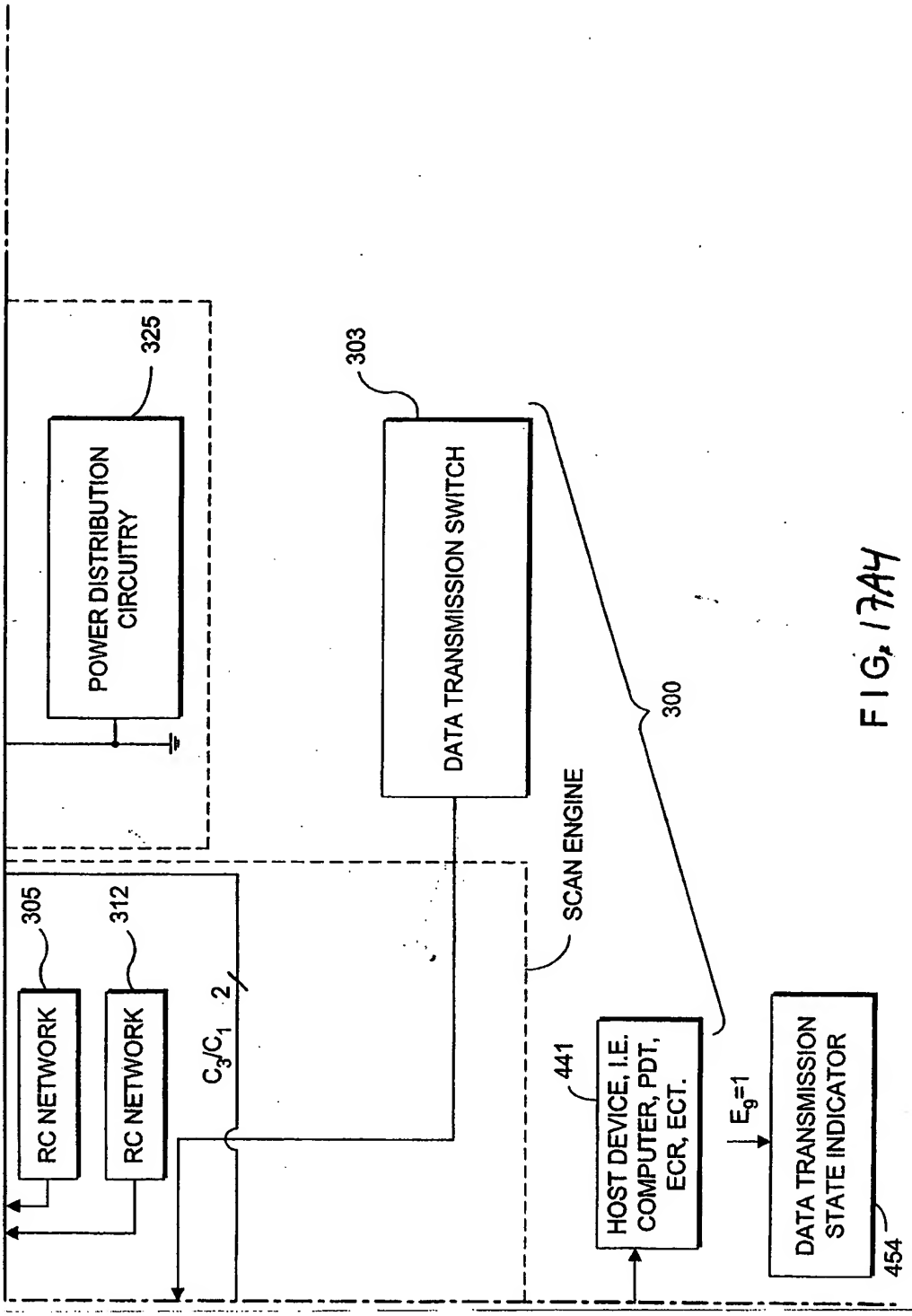

POWER DISTRIBUTION CIRCUITRY
325
303
DATA TRANSMISSION SWITCH
300
SCAN ENGINE
305
RC NETWORK
312
RC NETWORK
C_3/C_1 2
441
HOST DEVICE, I.E. COMPUTER, PDT, ECR, ECT.
E_g=1
DATA TRANSMISSION STATE INDICATOR
454

FIG. 17A

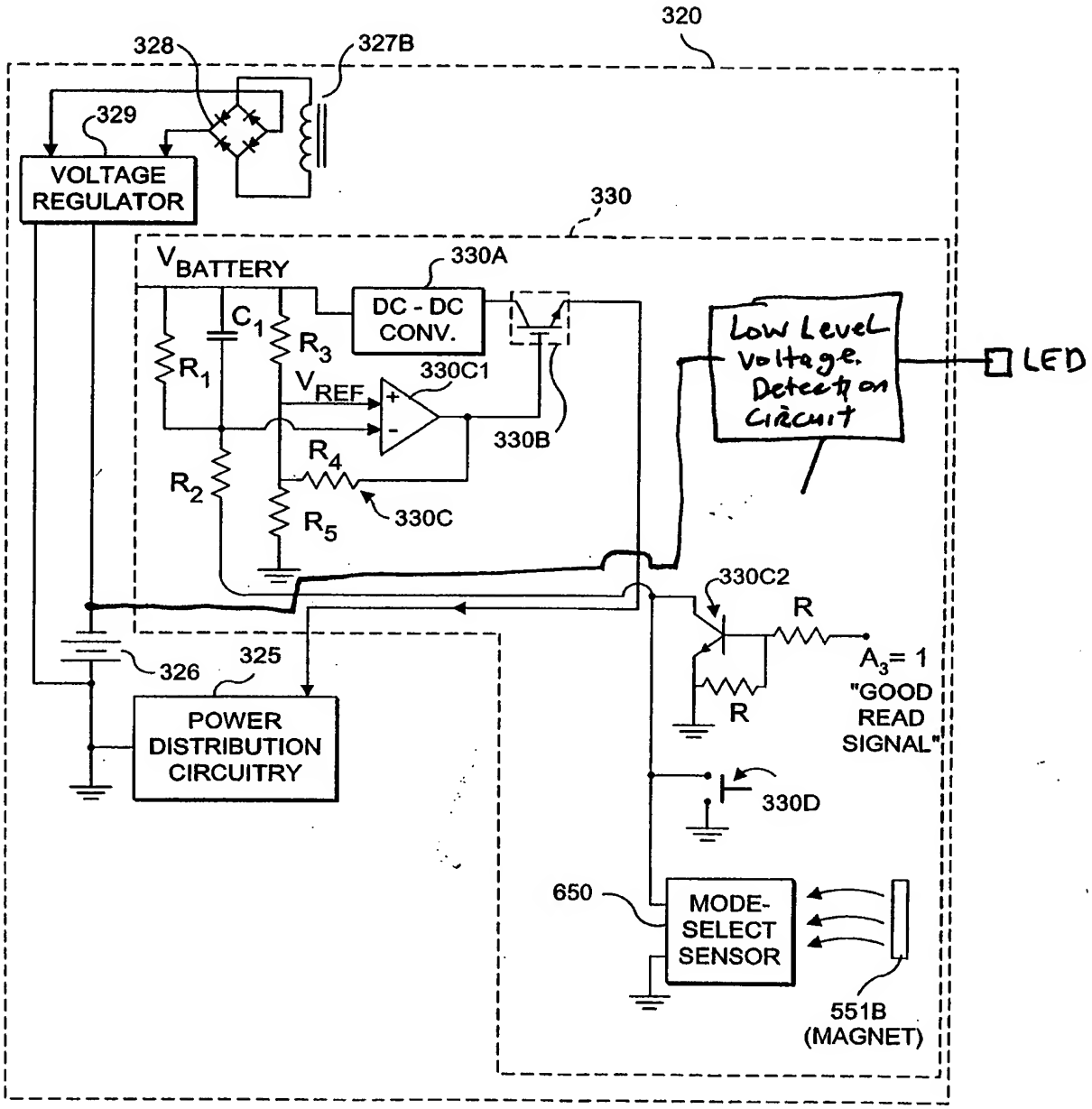

320
328
327B
329
VOLTAGE REGULATOR
330
$V_{BATTERY}$
330A
DC - DC CONV.
C_1
R_1
R_3
V_{REF}
330C1
330B
R_2
R_4
R_5
330C
Low Level Voltage Detection Circuit
LED
330C2
R
R
A_3= 1 "GOOD READ SIGNAL"
326
325
POWER DISTRIBUTION CIRCUITRY
330D
650
MODE-SELECT SENSOR
551B (MAGNET)

FIG. 17B

PDF DATA PACKET TRANSMISSION VIA 2-WAY RF WITH AUTOMATIC RF-RANGE DEPENDENT CONTROL (2-D READING MODE)

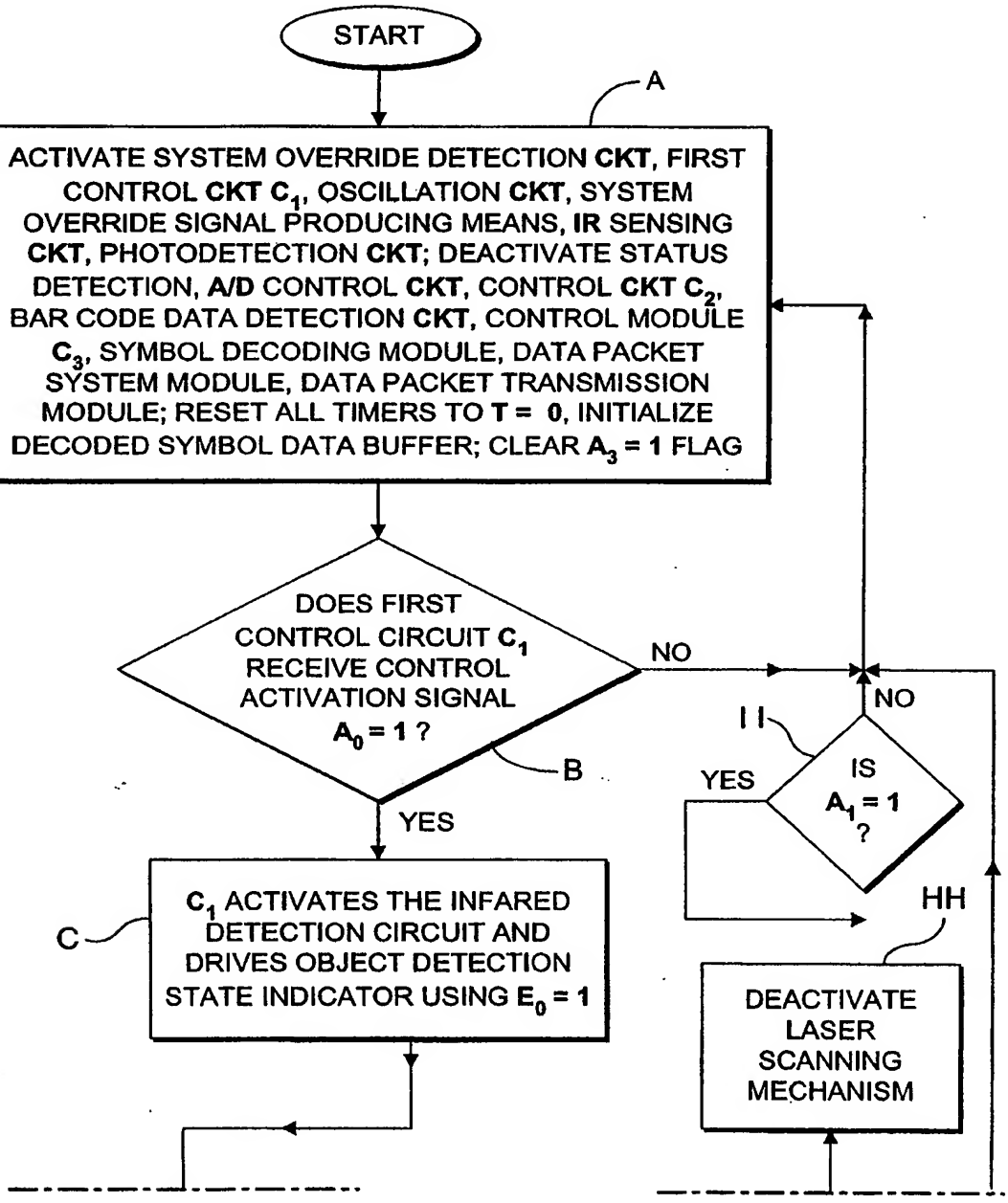


FIG. 18A

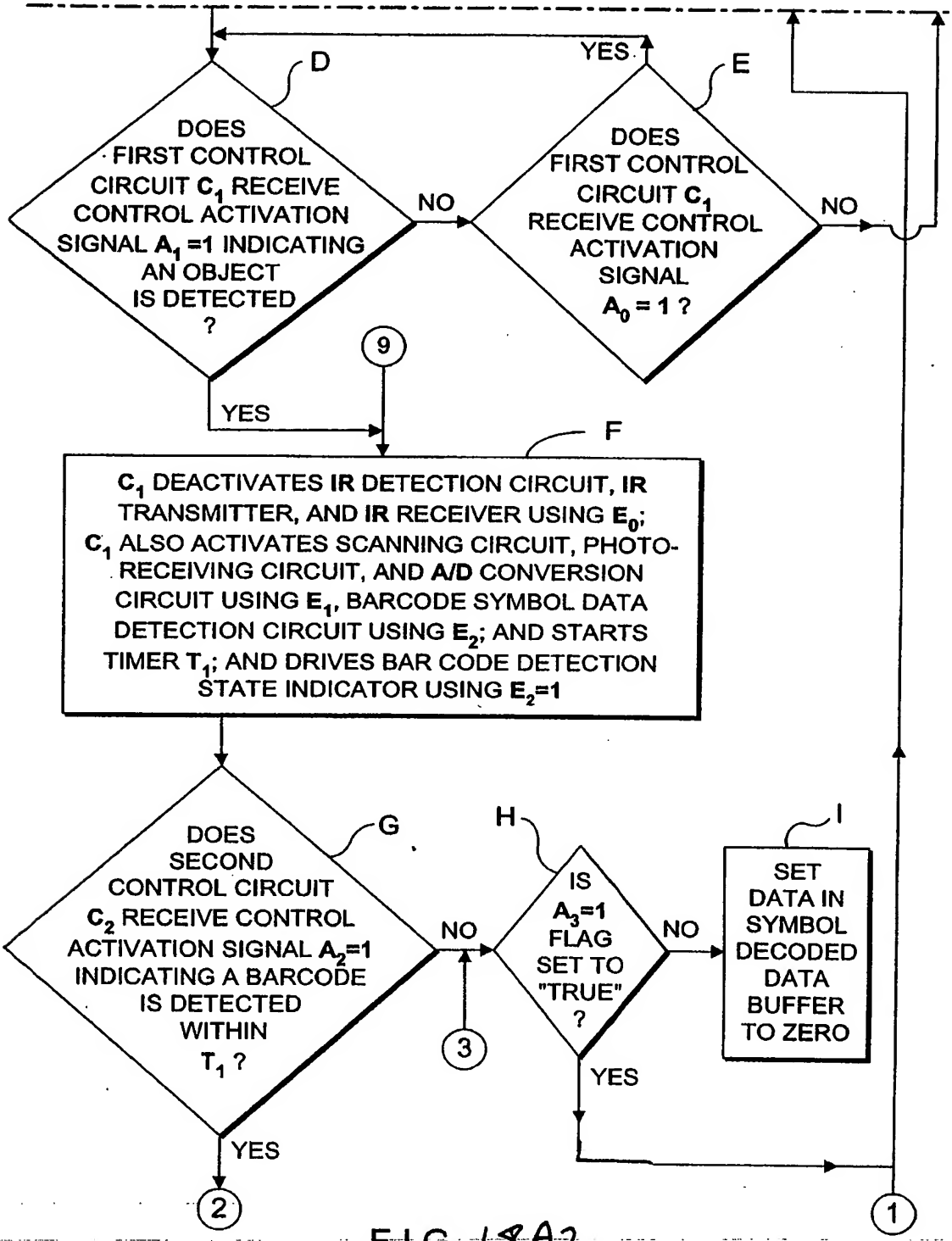

D
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_1 =1 INDICATING AN OBJECT IS DETECTED ?
NO
YES
E
DOES FIRST CONTROL CIRCUIT C_1 RECEIVE CONTROL ACTIVATION SIGNAL A_0 = 1 ?
NO
9
YES
F
C_1 DEACTIVATES IR DETECTION CIRCUIT, IR TRANSMITTER, AND IR RECEIVER USING E_0; C_1 ALSO ACTIVATES SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT, AND A/D CONVERSION CIRCUIT USING E_1, BARCODE SYMBOL DATA DETECTION CIRCUIT USING E_2; AND STARTS TIMER T_1; AND DRIVES BAR CODE DETECTION STATE INDICATOR USING E_2=1
G
DOES SECOND CONTROL CIRCUIT C_2 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 INDICATING A BARCODE IS DETECTED WITHIN T_1 ?
NO
H
IS A_3=1 FLAG SET TO "TRUE" ?
NO
I
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
3
YES
2
1

FIG. 18A2

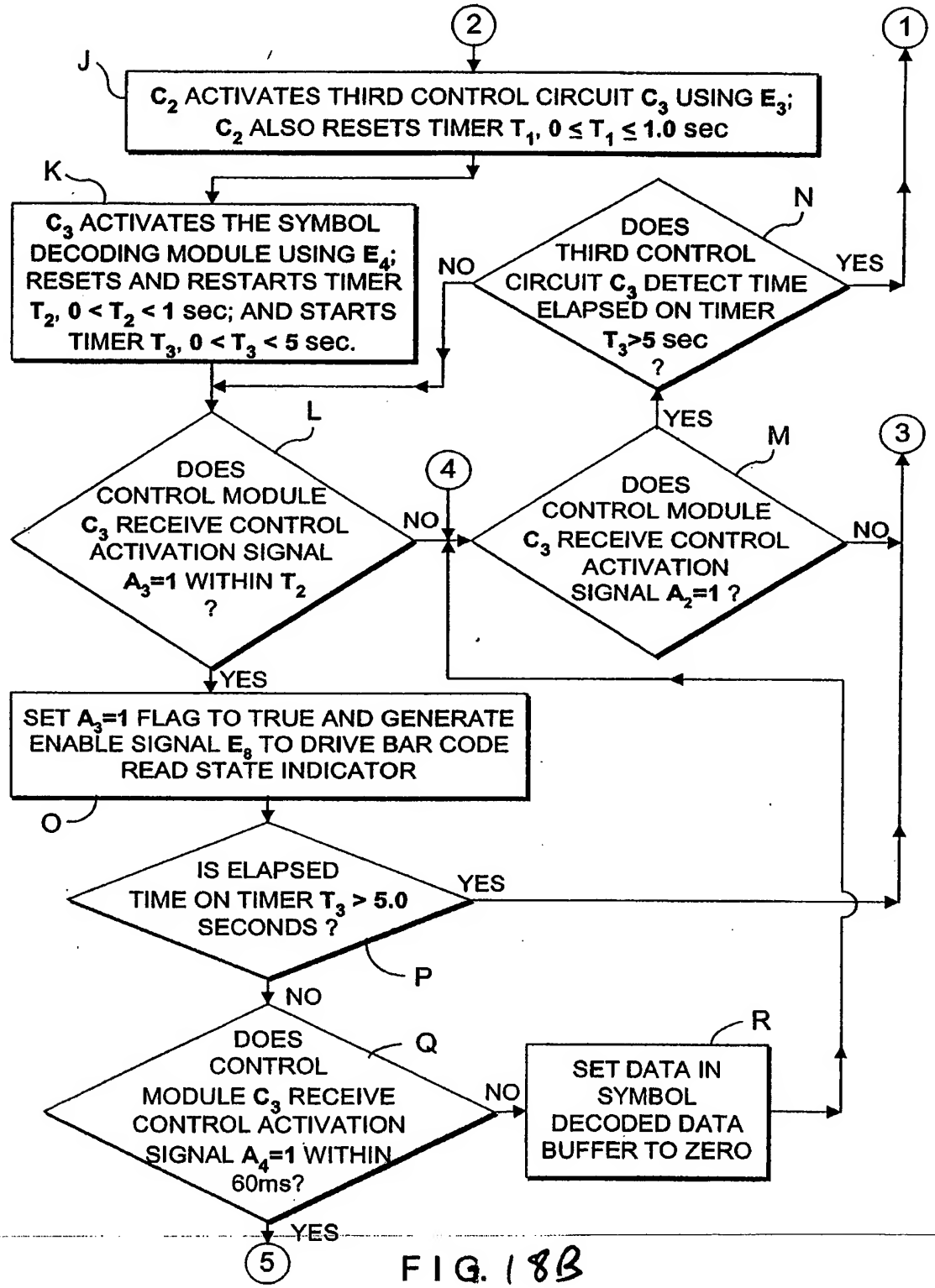

2
1
J
C_2 ACTIVATES THIRD CONTROL CIRCUIT C_3 USING E_3; C_2 ALSO RESETS TIMER T_1, $0 \leq T_1 \leq 1.0$ sec
K
C_3 ACTIVATES THE SYMBOL DECODING MODULE USING E_4; RESETS AND RESTARTS TIMER T_2, $0 < T_2 < 1$ sec; AND STARTS TIMER T_3, $0 < T_3 < 5$ sec.
N
DOES THIRD CONTROL CIRCUIT C_3 DETECT TIME ELAPSED ON TIMER T_3>5 sec ?
NO
YES
L
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_3=1 WITHIN T_2 ?
4
NO
YES
M
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_2=1 ?
NO
3
YES
SET A_3=1 FLAG TO TRUE AND GENERATE ENABLE SIGNAL E_8 TO DRIVE BAR CODE READ STATE INDICATOR
O
IS ELAPSED TIME ON TIMER T_3 > 5.0 SECONDS ?
YES
P
NO
DOES CONTROL MODULE C_3 RECEIVE CONTROL ACTIVATION SIGNAL A_4=1 WITHIN 60ms?
Q
NO
R
SET DATA IN SYMBOL DECODED DATA BUFFER TO ZERO
YES
5

FIG. 18B

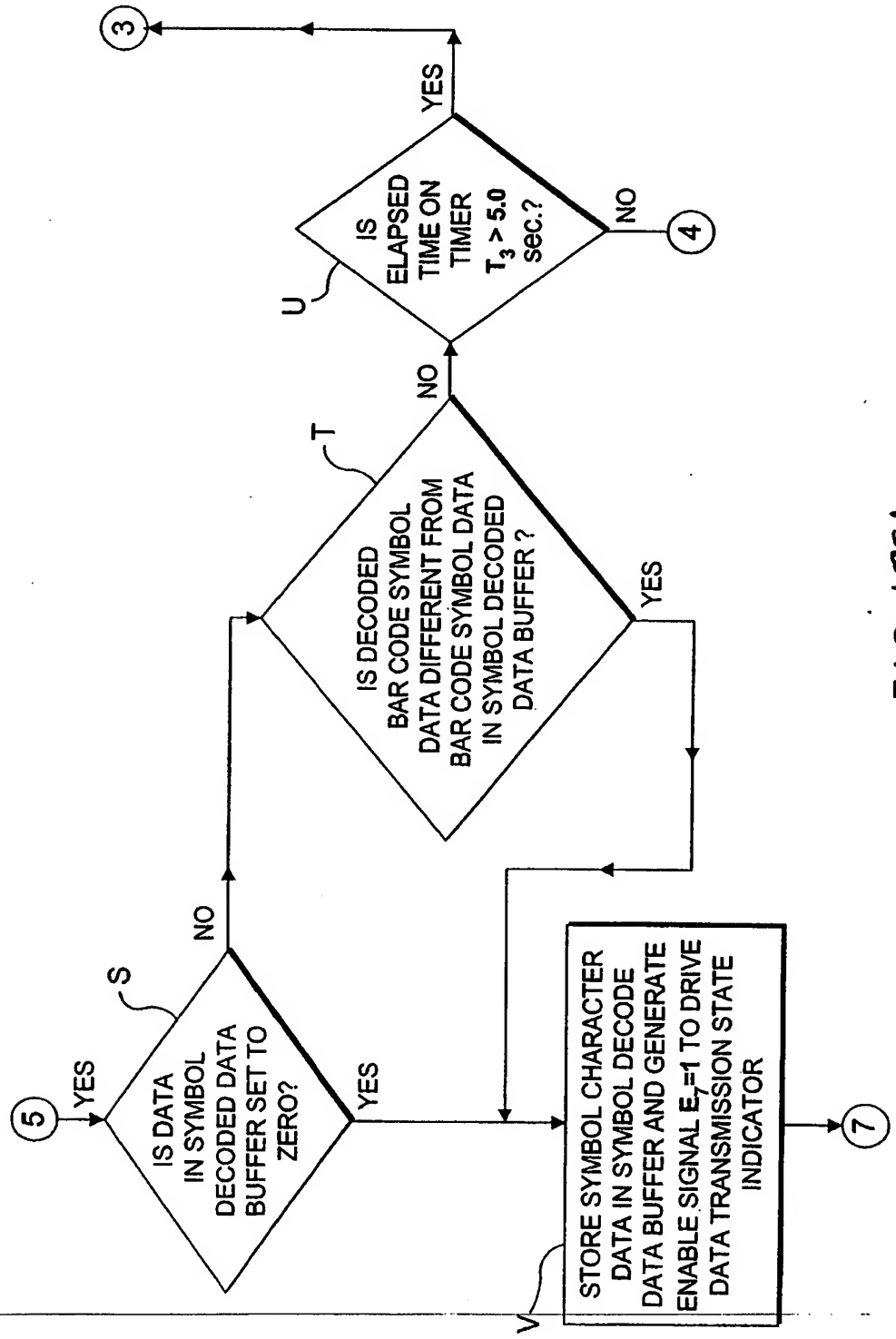

5
YES
S
IS DATA IN SYMBOL DECODED DATA BUFFER SET TO ZERO?
NO
YES
T
IS DECODED BAR CODE SYMBOL DATA DIFFERENT FROM BAR CODE SYMBOL DATA IN SYMBOL DECODED DATA BUFFER ?
NO
YES
U
IS ELAPSED TIME ON TIMER $T_3 > 5.0$ sec.?
YES
3
NO
4
V
STORE SYMBOL CHARACTER DATA IN SYMBOL DECODE DATA BUFFER AND GENERATE ENABLE SIGNAL E_7=1 TO DRIVE DATA TRANSMISSION STATE INDICATOR
7

FIG. 18C1

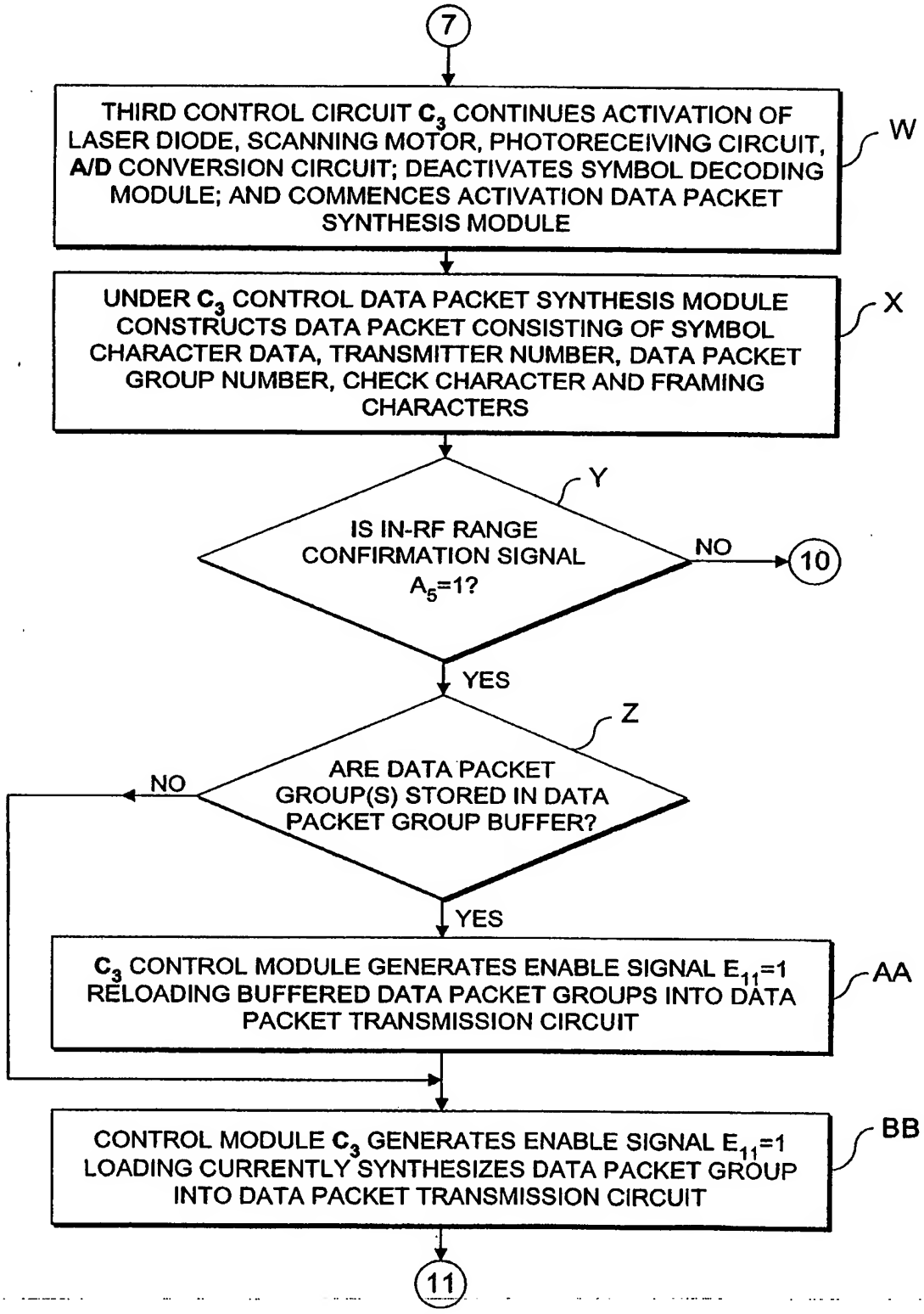

7
THIRD CONTROL CIRCUIT C_3 CONTINUES ACTIVATION OF LASER DIODE, SCANNING MOTOR, PHOTORECEIVING CIRCUIT, A/D CONVERSION CIRCUIT; DEACTIVATES SYMBOL DECODING MODULE; AND COMMENCES ACTIVATION DATA PACKET SYNTHESIS MODULE
W
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE CONSTRUCTS DATA PACKET CONSISTING OF SYMBOL CHARACTER DATA, TRANSMITTER NUMBER, DATA PACKET GROUP NUMBER, CHECK CHARACTER AND FRAMING CHARACTERS
X
Y
IS IN-RF RANGE CONFIRMATION SIGNAL A_5=1?
NO
10
YES
Z
ARE DATA PACKET GROUP(S) STORED IN DATA PACKET GROUP BUFFER?
NO
YES
C_3 CONTROL MODULE GENERATES ENABLE SIGNAL E_{11}=1 RELOADING BUFFERED DATA PACKET GROUPS INTO DATA PACKET TRANSMISSION CIRCUIT
AA
CONTROL MODULE C_3 GENERATES ENABLE SIGNAL E_{11}=1 LOADING CURRENTLY SYNTHESIZES DATA PACKET GROUP INTO DATA PACKET TRANSMISSION CIRCUIT
BB
11

FIG. 18C2

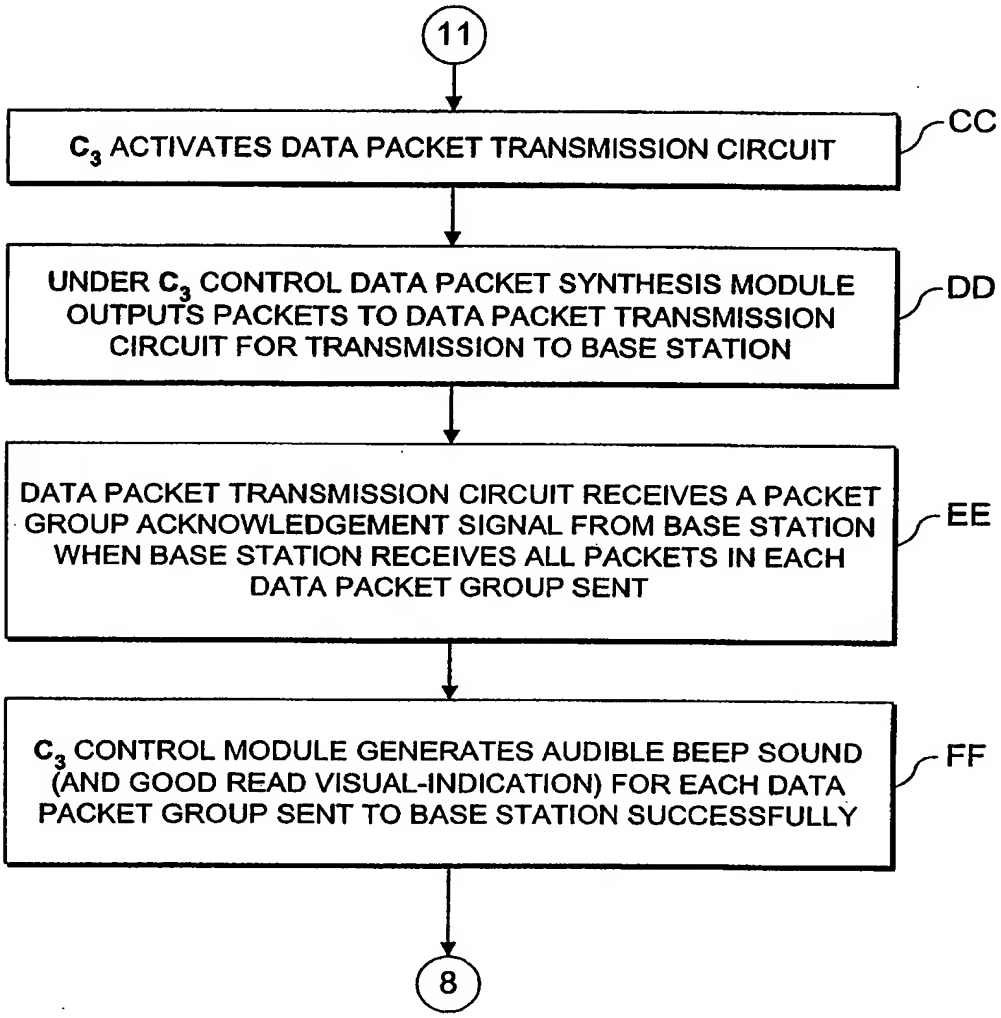

11
C_3 ACTIVATES DATA PACKET TRANSMISSION CIRCUIT
CC
UNDER C_3 CONTROL DATA PACKET SYNTHESIS MODULE OUTPUTS PACKETS TO DATA PACKET TRANSMISSION CIRCUIT FOR TRANSMISSION TO BASE STATION
DD
DATA PACKET TRANSMISSION CIRCUIT RECEIVES A PACKET GROUP ACKNOWLEDGEMENT SIGNAL FROM BASE STATION WHEN BASE STATION RECEIVES ALL PACKETS IN EACH DATA PACKET GROUP SENT
EE
C_3 CONTROL MODULE GENERATES AUDIBLE BEEP SOUND (AND GOOD READ VISUAL-INDICATION) FOR EACH DATA PACKET GROUP SENT TO BASE STATION SUCCESSFULLY
FF
8

FIG. 18C3

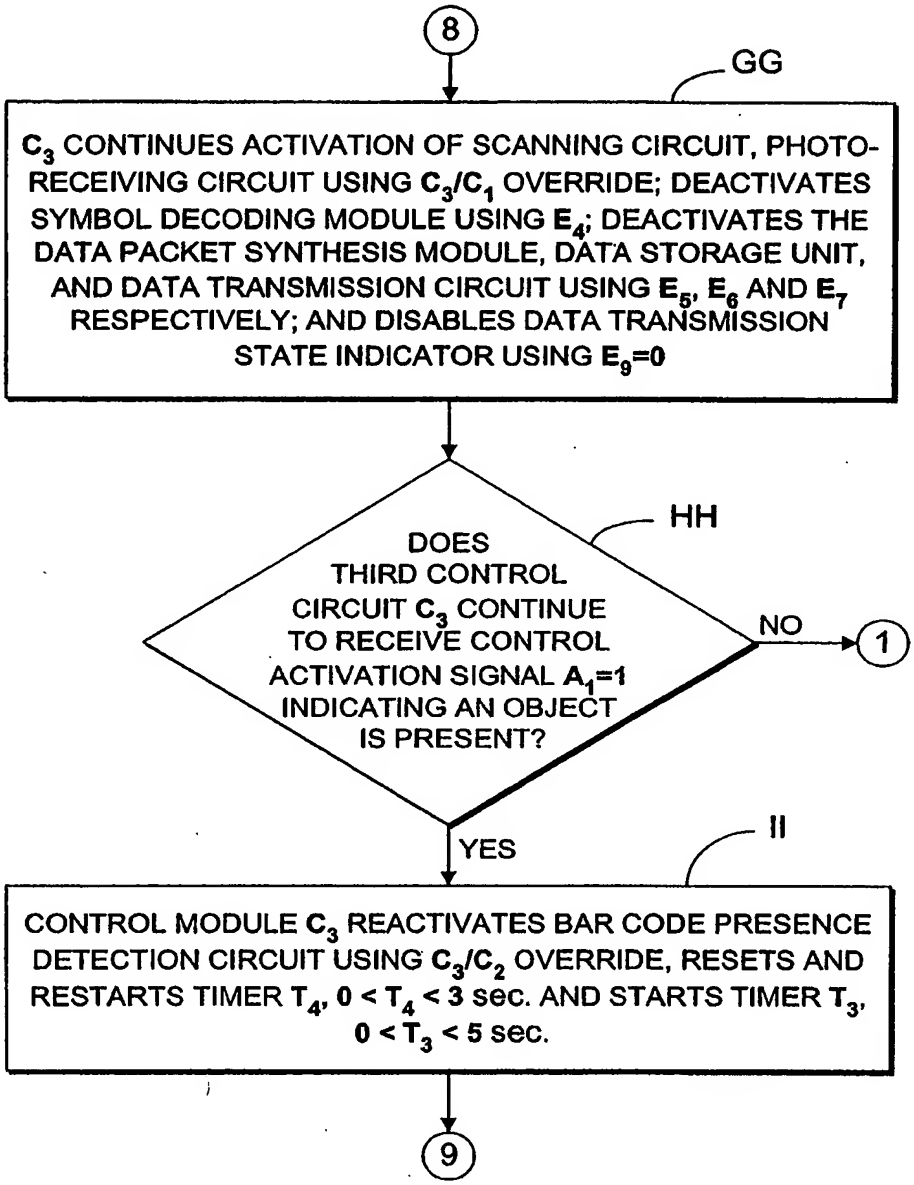

8
GG
C3 CONTINUES ACTIVATION OF SCANNING CIRCUIT, PHOTO-RECEIVING CIRCUIT USING C3/C1 OVERRIDE; DEACTIVATES SYMBOL DECODING MODULE USING E4; DEACTIVATES THE DATA PACKET SYNTHESIS MODULE, DATA STORAGE UNIT, AND DATA TRANSMISSION CIRCUIT USING E5, E6 AND E7 RESPECTIVELY; AND DISABLES DATA TRANSMISSION STATE INDICATOR USING E9=0
HH
DOES THIRD CONTROL CIRCUIT C3 CONTINUE TO RECEIVE CONTROL ACTIVATION SIGNAL A1=1 INDICATING AN OBJECT IS PRESENT?
NO
1
YES
II
CONTROL MODULE C3 REACTIVATES BAR CODE PRESENCE DETECTION CIRCUIT USING C3/C2 OVERRIDE, RESETS AND RESTARTS TIMER T4, 0 < T4 < 3 sec. AND STARTS TIMER T3, 0 < T3 < 5 sec.
9

FIG. 18C4